BENEFITS OF TEACHING BASIC COMPUTER LITERACY SKILLS TO NAVAL ENGINEERING APPRENTICES

by

Jerry D. Skirvin Jr.
B.S. in Workforce Education and Development, December 2005
Southern Illinois University Carbondale

A Thesis Submitted in Partial Fulfillment of the Requirements for the
Master of Science in Education Degree

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THESIS APPROVAL

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Approved by:

Beth Winfrey Freeburg, Ph.D., Chair

Jeffery Flesher, Ph.D.

M. Eugene Hall, Ph.D.

Graduate School
Southern Illinois University Carbondale
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TITLE: BENEFITS OF TEACHING BASIC COMPUTER LITERACY SKILLS TO NAVAL ENGINEERING APPRENTICES

MAJOR PROFESSOR: Dr. Beth Winfrey Freeburg

This quantitative research study was designed and conducted to gain an understanding of the current levels of basic computer literacy skills of the Naval Engineering Apprentices entering the Basic Engineering Common Core (BECC) course, the current levels of naval engineering knowledge of the Apprentices entering BECC, if there was a benefit to achieving basic computer literacy skills prior to entering the BECC course, if there was a particular Grasha-Reichmann Student Learning Style that was best suited for e-learning as a Naval Engineering Apprentice in the BECC course, and if there was a relationship between learning style, computer literacy level, and success in the BECC course. One hundred and twenty-one Naval Engineering Apprentices entering the BECC course participated in the study. A *General Computer Operations - Self-Assessment* (*General computer operations: Self-assessment*, 2006) and the *Computer and Internet - Self-Assessment (Computer an Internet: Self-assessment*, 2006), adapted from a Minnesota State Colleges and Universities and University of Minnesota Distance Learning Initiative, was used to determine the baseline basic computer literacy skills of the Apprentices. The Grasha-Reichmann Student Learning Style Scale (GRSLSS) was

administered to determine the preferred learning style of the Apprentices. Findings revealed that there was no correlation (Phillips, 1997) between learning style, computer literacy level and success in the BECC course. The study used a regression equation constructed as such; Grade Point Average (GPA) = a + b(Learning Style) + b(Computer Literacy Score) + b(Overall Computer Literacy) (C. K. Waugh, personal communications, May 31, 2007) to determine if there was a correlation between GPA, learning style, and computer literacy. With this regression model, only 1.6% of the variance in GPA was explained by the 3 variables. This is a very small number. In other words, none of these variables appear to be related to GPA. The study also ran a correlation matrix to see how each variable was related to the others. Not surprisingly, only *General Computer Operations - Self-Assessment* scores (*General computer operations: Self-assessment*, 2006) and *Computer and Internet - Self-Assessment* scores *(Computer and Internet: Self-assessment*, 2006), were correlated with a medium degree of positive correlation (r = .562) (Phillips, 1997). So, this is added evidence that learning style and computer literacy are poor predictors of GPA.

DEDICATION

I dedicate this research project to my wife, Tris, because without her motivation and prompting this would have never come to fruition.

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CHAPTER 1

INTRODUCTION

Need for the Study

The U.S. Navy employs individuals in the Naval Engineering Apprentice fields to operate, troubleshoot, and maintain various engineering systems found onboard U.S. Naval ships and shore commands. These fields include, Electricians Mates (EM), Damage Controlman (DC), Engineman (EN), Hull Maintenance Technicians (HT), Gas Turbine Systems Technicians (Electrical and Mechanical (GSE/GSM)), Machinery Repairman (MR), and Machinist's Mates (MM). Naval Engineering Apprentices are entry level positions in any of these fields and are generally filled by sailors with various educational backgrounds, including high school and non-high school graduates and individuals with various levels of college experience.

The U.S. Navy has accepted the Revolution in Training initiative (U.S. Department of Defense, Department of the Navy, 2001). The revolution is a U.S. Navy initiative to revamp not only current training and education structures, but create an environment of learning that promotes growth by giving sailors the tools and opportunities to learn, grow, and lead. For example, the Naval Engineering Apprentices entering the Basic Engineering Common Core (BECC) course now receive what the Navy considers to be the right training at the right time. Prior to implementing this initiative Naval Engineering Apprentices would receive training that they might not use for years to come, hence wasted money and resources. With this initiative the U.S. Navy has shifted some of its training from the legacy-based, instructor led training to computer-based, self-paced e-learning.

Historically, Naval Engineering Apprentices were taught in a traditional classroom environment. Classes were conducted by a qualified Naval Engineering Instructor. A qualified Naval Engineering Instructor is an instructor that would first, attend the course of study and complete the course with an average of 95% or better. Upon completion of the course the instructor would then teach the course under the supervision of a previously qualified Naval Engineering Instructor. During the supervised teaching of the course the instructor would be evaluated on their technical expertise and instructing techniques to ensure that they could conduct the class in a professional and effective manner. Each qualifying Naval Engineering Instructor would be evaluated in three separate topics, within the curricula, and on three separate occasions. These occasions would be at least 3 weeks apart from each other. These classes were taught using overhead projectors, PowerPoint presentations, and occasionally a static display, or mock up, of the component or components being taught.

All Naval Engineering Apprentices are enrolled in the Basic Engineering Common Core (BECC) course. Each Naval Engineering Apprentice are taught the basics of Naval Engineering, including topics such as basic first aid, environmental controls, dewatering equipment, heat stress fundamentals, pumps, valves, piping and tubing, gears, bearings, propulsion systems, heat exchangers, portable fire extinguishers, chemical, biological and radiological warfare theories, and basic shipboard firefighting techniques.

However, with the Revolution in Training, each Naval Engineering Apprentice will now be exposed to an e-learning environment which requires a basic understanding of computers and Internet navigation. *Information Literacy Competency Standards for Higher Education*, the Association of College and Research Libraries (2000) defined computer and/or technology literacy as "rote learning of specific hardware and software applications" (p. 5). The U.S. Department of Education (1996) defined computer literacy as "the ability to use computers and other technology to improve learning, productivity, and performance" (p. 5). Harvey (1983) defined computer literacy as the idea that there is some basic familiarity with computers which all students need in order to compete in the job market, or to be informed citizens. A more recent definition of computer literacy by McKay (2006) explained that being computer literate means there are some basics that a person should be able to perform; "…how to save and open files, how to use a word processing program, and how to send and receive email. It means having some sort of level of comfort around computers rather than a look of fear and a feeling of foreboding" (p. 1).

The students that enter Naval Engineering Apprentice training have diverse educational and technological backgrounds. Specifically, Naval Engineering Apprentices may lack the required basic computer literacy skills needed in order to be successful in BECC. Each trainee will be required to complete more than 100 individual topics, in an e-learning environment while enrolled in the BECC course. Without these basic computer literacy skills the Naval Engineering Apprentice may become demotivated and their learning experience may be hindered. As well, they may not be situated to excel in their careers after they graduate BECC and continue on with their naval careers.

Christensen, Anakwe, and Kessler (2001) reported that in general students will have a more negative than positive attitude toward distance learning (i.e., e-learning). The more interactive the e-learning is, the more similar it is to the traditional classroom and hence the students will be more receptive to it. This may be partially due to the students' lack of exposure to the computer technology. An important fact to remember will be that no matter the computer literacy level of the Naval Engineering Apprentice, improving students' computer skills will always be a factor in online courses (Shelton, 2000).

As distance education becomes more popular and as traditional courses require more online assignments, teachers must consider students' perceptions of online learning (Peters, 2001). While some Naval Engineering Instructors may embrace this technology, many of the Naval Engineering Apprentices may experience confusion and frustration. These perceptions as well as their learning styles may have an effect on their success in the BECC course.

Understanding the Naval Engineering Apprentices' learning style can assist the Naval Engineering Instructors in determining if any special considerations or accommodations, that can be made, will help the Apprentice to be more successful in the BECC course. Many studies have been conducted to determine if there is a particular or preferred learning style, which correlates with success in computer-based learning. The Grasha-Reichmann Student Learning Style Scale (GRSLSS) seems ideal for assessing student learning performance in a college-level distance learning setting (Diaz & Cartnal, 1999). Naval Engineering Apprentice training is often considered to be college level education. In fact the Naval Engineering Apprentices' receive college credits for completing the BECC course. The environment may be more structured than a college campus, but the amount of work and determination to complete the courses is ever present.

Each learning style identified by the GRSLSS encompasses different qualities. Some are more suited for e-learning than others. An independent learner prefers independent study and self-paced instruction and would prefer to work alone. On the other side of the scale are dependent learners. Dependent learners look to the teacher and to peers as a source of structure and guidance and prefer an authority figure to tell them what to do. With the self-paced e-learning in the BECC course, these two different styles of learners may have different levels of success.

Purpose of the Study

The purpose of the study is to contribute to a better understanding of the relationship between basic computer literacy skills, learning style, and success in an e-learning environment. More specifically, the study will attempt to determine if Naval Engineering Apprentices' basic computer literacy skills are prerequisite to BECC course success. In addition, the study will determine if Naval Engineering Apprentices' learning style, in accordance with the GRSLSS, is a determinant to BECC course success.

Statement of the Problem

What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning and are there particular learning styles that favor success in the course?

Research Questions

1. What are the current levels of basic computer literacy skills, self assessed, of Naval Engineering Apprentices entering BECC?
2. What are the current levels of Naval engineering knowledge of Naval Engineering Apprentices entering BECC?
3. What benefits exist for Naval Engineering Apprentices to achieve basic computer literacy skills prior to entry into BECC?
4. Which Grasha-Reichmann Student Learning Style is best suited for e-learning as a Naval Engineering Apprentice in the BECC course?
5. Is there a relationship between learning style, computer literacy, and success in the BECC course?

Definition of Terms

Basic computer literacy skills – a basic understanding of computers, computer applications, computer usage, computer programs and the ability to use computers to further learning, productivity, and performance.

Basic Engineering Common Core (BECC) course – Entry level school were Naval Engineering Apprentices are taught the basics of Naval Engineering, including topics such as basic first aid, environmental controls, dewatering equipment, heat stress fundamentals, pumps, valves, piping and tubing, gears, bearings, propulsion systems, heat exchangers, portable fire extinguishers, chemical, biological and radiological warfare theories, and basic shipboard firefighting techniques. The course is divided into modules were each is pre-tested and post-tested for knowledge-in versus knowledge-out.

Benefits – elements that are helpful or advantageous.

e-learning – 24/7 access for sailors to course-work, lectures, demonstrations, and interactive education on the Internet.

Internet – A worldwide network of interconnected computers (American Psychological Association, 2001). A place where World Wide Web (WWW) pages can be accessed and created.

Internet navigation – The ability to effectively move about the Internet and locate information and resources.

Learning styles – Personal dispositions that influence a student's ability to acquire and comprehend information, to interact with classmates and teacher, and to otherwise participate in the learning experience are called learning styles (Grasha, 1996, p. 41).

Legacy-based training – paper-based training using overhead projectors, PowerPoint presentations, and static displays.

Naval Engineering Instructor – An instructor qualified to teach the Basic Engineering Common Core (BECC) course.

Naval Engineering Apprentice – an entry level position in the U.S. Navy that operates, troubleshoots, and maintains various engineering systems found onboard U.S. Naval ships and shore commands.

Revolution in Training – Navy initiative to revamp not only current training and education structures, but create an environment of learning that promotes growth by giving sailors the tools and opportunities to learn, grow and lead.

World Wide Web (WWW) – A very large number of electronically interconnected computers, around the globe, which are able to connect to each other and share information and resources.

CHAPTER 2

REVIEW OF RELATED LITERATURE

What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning and are there particular learning styles that favor success in the course?

Overview

What is the benefit of basic computer literacy skills for students entering an online or e-learning type course of instruction? Is it prerequisite to course success? What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning? These are all questions that need answering.

This study used various types of references from across the globe. Most articles were retrieved via the Internet; however some materials were gathered from the University of Illinois, Southern Illinois University Carbondale Morris Library and the Great Lakes Naval Station Library. The studies Internet articles were journals based on a print source, retrieved on the Internet, and Internet-only Journals. Some documents were retrieved from University, national and international, websites and others were retrieved from Department of Defense websites.

Revolution in Training

In October 2000, a review panel was chartered by the Chief of Naval Operations to conduct an Executive Review of Navy Training (ERNT). Top leadership in the Navy had realized that the Navy's training system had fallen behind the technology curve that was sweeping across the globe. The review panel was asked to examine the Navy's current training plan and recommend ways to improve it. The review panel would also recommend ways the Navy could implement new technologies and ways to exploit opportunities that the private sector may propose. Another important task was for the review panel to develop a continuum for lifelong learning. This was to be tailored to each sailor. Lastly, the review panel was to take into account that all of the recommendations must promote each sailor's personal and professional growth.

The Navy's top leadership believed that the heart of the Navy lies within its sailors. The more sailors are developed personally and professionally, the more personal and professional the Navy will be. The *Revolution in Training* (2001) reported the following three important findings:

> First, demands for training are increasing, as technology plays an ever more important role in naval warfare. In fact, the number of missions is growing for most platforms, and the complexity of the jobs for Sailors within those platforms is growing as well. Second, the supply of experienced Sailors (especially Enlisted Sailors) is declining as the Sailors who represent the experience "dividend" remaining from the drawdown of the 1990s reach retirement eligibility. Third, the recruiting market is as challenging as it has ever been, while enlisted attrition continues to deplete the ranks of trained Sailors. (p. i)

With these findings brought forth by the ERNT, the Navy realized that a swift and adept implementation of the *Revolution in Training* was required.

Knowing that the Navy needed to be on the leading edge of technology and that the Navy's sailors needed to be trained for that technology (U.S. Department of Defense, Department of the Navy, 2001) came to two central conclusions:

> Today's Navy training system is neither postured nor organized to produce and maintain the trained force of Sailors required in this environment. And, the gap between what high-quality Sailors and potential Sailors want and expect in their personal and professional learning, and what the Navy is prepared to deliver, is too great to make the Navy an employer of choice today…Research tells us a great deal about the science of learning; that science should be applied to Navy training. Research and the experience of industry are showing us how to impart knowledge, skills, and abilities in new ways to improve job performance. And, in industry, commercial enterprises are telling us that investments in the learning of people pay off in improvements in profitability and employee effectiveness and satisfaction, and reductions in employee turnover. (p. i)

The revolution in training is about excelling. It is about doing what is right for the sailors of the future. It is about providing them the very best education and every opportunity that the U.S. Navy can afford and that the sailors mind will allow. Flynn (2003) quoted Commander, Naval Personnel Development Command RADM Kevin Moran as saying, "The Revolution in Navy Training is about developing Sailors professionally and personally" (p. 1).

In Summerfield (2005) RADM Moran had asked several reflective questions concerning the Revolution in Training. "What needs to stay in the classroom?" "What content could be delivered Web-enable?" In trying to bring the Navy's training into the

21^{st} century Moran began implementing learning solutions that included modalities like e-learning, coaching sessions and simulations in addition to the traditional classroom-based method (Summerfield, 2005).

This new way of thinking for the Navy has reformed much of its training courses. A snap shot of Navy training 6 years ago would have revealed traditional classroom-based instruction in every corner of the photo. This type of learning may be what many today consider to be too restrictive to the students' learning. Students should be allowed to move or learn at their own pace. The student can determine how much information or content that he or she can absorb in one day. The Navy is now embracing this concept.

Today, however, the majority of Navy training is computer-based, e-learning, and online simulations. Not everyone agrees that this is best for today's sailor. Critics like Willis (n.d.) pointed out, "Online courses aren't the best way to do that though. Like the paper correspondence of old, they are educationally suspect for the most part, and far too much like a quick fix" (p. 1). Further, Willis argued that "The basis for this appears to be belief that everyone will be motivated equally to complete these online programs, and that the Navy will have the funds and personnel to be all things to all learners of every style" (p. 1).

What is Computer Literacy?

Literacy is a term that can mean many different things. It is a term which definition has changed over the years. When combined with other words like computer, technology, or information, its definition will take on a whole new meaning. Information literacy in a broad definition will include both technology literacy and computer literacy.

Since so much *information* can be found with computers and computers are considered to be a part of technology, these definitions can sometimes be intermingled.

Is "computer literacy" synonymous with "technology literacy" (Cesarini, 2004, p. 1)? Computers, for all intensive purposes, can be considered a subsection of technology. They (computers) may even be considered to be the root cause for new technology. Technology can encompass such a broad range of devices that it makes sense to define them separately. Here defined separately, *computer literacy* means a basic understanding of computers, computer applications, computer usage, computer programs and the ability to use computers to further learning, productivity, and performance (U. S. Department of Education, 1996). Wikipedia.com defined computer literacy as the knowledge and ability a person has to use computers and technology efficiently. It also mentions that it can refer to the comfort level someone has with using computer programs and other applications that are associated with computers (*Computer Literacy*, 2006). *Technology literacy* means the basic understanding of technological devices such as cell phones, gaming machines, personal data assistants (PDA), global positioning systems (GPS), personal check-out systems, MP3 and iPod players, and other personal, portable electronic devices. The Association of College and Research Libraries (2000) further defined *computer literacy* as "rote learning of specific hardware and software applications" (p. 3).

Critics argued that computer literacy needs to be gained by not only the student but by the teacher. How can teachers expect their students to learn how to use this new technology if they themselves cannot? There is a need for students to understand it and be able to incorporate it into their lives. As Cesarini (2004) stated:

> Our students deserve to develop critical literacies of the industry many of them will intentionally or unintentionally graduate into…They deserve to use technologies not merely as uninformed end users, not merely as skilled professionals, technically competent in rote, application-specific tasks; rather, our students deserve to understand how the various information technologies they intentionally or unintentionally encounter every day work. (p. 12)

Merrill (2004) stated the following:

> In addition to matching the learner preparation and abilities to the course level and content, other factors that contribute to facilitating of online learning best practices include understanding the technologies, effective course design, the multiple roles of the facilitator, developing your own online style, and effective group interaction. (p.13)

Merrill (2004) further emphasized that even the facilitator or the teacher of online, distance education courses needs to comprehend the technologies with which they use to educate others. Each of these authors believes that the facilitators play a key role in each student's success in an online course; Cesarini (2004) in that the student needs it for the future and Merrill in that they need it for the present, while enrolled in the course.

The New Fad: e-learning

E-learning has become more and more popular since its invention in the early 1990s. Students across the globe have flocked to educational institutions to enroll and complete an eLearning or online course of instruction. An estimated 33% of American colleges and universities offered distance education programs by 1995 (Westbrook, 1999,

p. 32). Westbrook further explained that by 1998, this number had grown to nearly 60%. The trend was to appeal to the masses. With distance education these institutions could reach more people and allow them the opportunity to complete the classes at a time best for them and in a location that suited them. With more and more people going back to school in the workforce, having this flexibility has been very attractive.

There have been varying opinions though as to the success of these online, distance education courses. For individuals that have limited computer experience, most conclude that these types of courses will be difficult and sometimes extremely frustrating. Shelton (1999) concluded that there are ten things and instructor can do to help out students that are taking online classes for the first time. These techniques include: (1) identify students' computer performance levels before enrollment; (2) continue to assess students' skills and attitudes; (3) vary instructional components; (4) provide technical support; (5) create a departmental gateway World Wide Web (WWW) site to expand technical support provided to students; (6) hold first class meetings on campus to enable students to meet with instructors and other students at one time in person; (7) recruit graduate assistants' help; (8) offer course content in multiple avenues; (9) rely on the flexibility of multiple communications avenues; and (10) make phone calls and mail preliminary handouts.

As Birchall and Woolfall (2006) explained about e-learning and business, "Early investment in e-learning has been based mainly on maximising cost-efficiencies and effectiveness" (para. 1). Furthermore, e-learning has shown much promise in helping businesses' to deliver training in a more cost effective manner. Of five case studies conducted, Birchall and Woolfall (2006) stated that "The common theme running through each case is the strength of commitment from senior executives to the development of human capital and particularly through e-learning" (para. 5). With buy-in from senior management on down, e-learning can be an effective training tool in business.

Businesses play a major role in skill formation, alongside education and training institutions (Schofield, 2003). Corporate training, formal and informal, is big business. Billions and billions of dollars are spent each year on training. However, companies like Thiess may still be "…unconvinced that e-learning could contribute substantially to its human resource development strategy" (p. 170). On the other side of this is Vice Admiral J. Kevin Moran, Commander, Naval Personnel Development Command, United States Navy. Vice Admiral Moran believes that e-learning is a keystone to the Navy's training success (Summerfield, 2005). In fact, "The Navy spends approximately 14 percent of its total annual funding, about $10 billion, on training" (para. 15). One of the risks that the Navy has with e-learning is that it will allow the trainee, or sailor, an opportunity to work at their own pace and in turn reduce the time required to train and therefore save the Navy money.

The National Centre for Vocational Education Research Ltd (2003) explained that e-learning can be seen as a valuable tool in networking. It can be used as an information sharing device where people can exchange ideas, discuss better ways of conducting business, and share what they have learnt. "E-learning has become a major tool for training and learning in Australia and internationally" (p. 8).

Is e-learning as good as some believe it to be? Why should we choose e-learning over more traditional types of training? CBT Direct (n.d.) has several reasons why they believe companies should choose e-learning. The first reason stated is that e-learning provides immediate feedback. This allows both the instructor or facilitator and trainees to monitor progress and adjust accordingly. In turn this allows the trainee to decide how much time he or she needs to spend on a particular area. They could spend less time in areas of proficiency and more time on weaknesses. Secondly, e-learning provides for the integration of text, graphics, and sound. When multiple senses are involved people tend to remember more of what they have learned. As well, it is usually a more enjoyable experience. Thirdly, e-learning is cost effective. After initial costs, the training can be used 24-hours a day and can be used anywhere in the world. Fourthly, older adults may feel threatened by the atmosphere of the traditional classroom. Some of them may not have been in one for many years. E-learning systems can be non-judgmental and non-threatening. They can also actively involve the trainee and provide a more satisfying learning experience. As a final point, e-learning is tireless and consistent. It is a superior training option because it never needs a break, it is always available, it can train a large number of people in a given timeframe, and it provides consistency of training in terms of the quality of information presented (CBT Direct, n.d.).

Learning Styles

Logan and Thomas (2002) explained that “Learning styles are very closely related to cognitive styles and the two terms are often used interchangeably. However, learning styles are best regarded as an extension to cognitive styles to distinguish the act of learning from simple processing of information” (p. ii). As with most things in life, people do things in different ways. Learning is one of them. Ames (2003) found that “Organisms acquire information about the world around them in different ways.

Cognitive science, a widely embraced paradigm in the social and behavioral sciences, attempts to explain how thinking beings collect, process, and use information obtained from the environment" (pp. 232-233). Learning styles can be influenced by a number of factors: affective, cognitive, physical, physiological, and environmental (Wakefield, 2000). Wakefield summarized learning styles with stating "Learning styles and preferences are not stable constructs, as such, they may change over time and in different situations" (p. 94).

Learning style identifiers describe how individuals acquire information and how it's processed or acted upon once acquired (Ames, 2003). Gregorc (1982) proposed a theory based on Jungian typology that explained learning style based on two bipolar dimensions: perception and ordering. Perception was then categorized as concreteness or abstractness. Ordering was categorized as either random or sequential. Gregorc then coupled these two qualities to define four distinct learning styles: Abstract Sequential (AS), Abstract Random (AR), Concrete Sequential (CS), and Concrete Random (CR). Gregorc later developed the Gregorc Style Delineator (GSD) that measures the degrees to which adults employ these four qualities therefore identifying them with a preferred learning style.

Kolb's Learning Style Inventory (KLSI) is described as a cognitive learning style mode (James & Gardner, 1995). Dictionary.com (2006) defined cognition as "The mental process of knowing, including aspects such as awareness, perception, reasoning, and judgment" (para. 1). The KLSI is a 12-item assessment tool that can be used to identify learning styles, and explores the opportunities different styles present for: problem solving, working in teams, resolving conflict, communicating at work, communicating at home, and considering a career (Hay Resources Direct, n.d.). The KLSI categorizes learner into four different groups; Diverger, Accommodator, Converger, or Assimilator (Wang, Wang, Wang, & Huang, 2006).

Another frequently used learning style inventory is the Canfield Learning Style inventory (LSI). Canfield LSI places the learners into one of nine learning style typologies: Social, Applied, Independent, Neutral, Conceptual, Social/Applied, Social/Conceptual, Independent/Applied, and Independent/Conceptual (Canfield, 1980). However, critics of this instrument say that it has limiting factors. Stitt-Gohdes (2001) believed that "A criticism of the Canfield LSI is its forced-choice nature of having to rank alternatives from most preferred to least preferred" (p. 35). Diaz and Cartnal (1999) felt that both the Canfield Inventory and the Kolb LSI create a narrow range of applicability for learning styles by limiting learning preferences to one or two dimensions (p. 131).

The Grasha Reichmann Student Learning Style Scale (GRSLSS) is yet another instrument that can be used to determine students learning style. The GRSLSS is not free from criticism either. Ferrari et al. (1996) concluded in their research that "three of the six scales appear to be defective because of low reliability estimates" (p. 167). Even with this criticism the GRSLSS seems to be the LSI of choice for many researchers.

The GRSLSS defines students as *Independent, Avoidant, Collaborative, Dependent, Competitive, and Participant.* In Diaz and Cartnal (1999) the GRSLSS was chosen because it is designed for senior high school and college students. They also chose it because it focuses on how students interact with the instructor, other students, and with learning in general.

When trying to decide which instrument to use to implicate a student's learning style, there are a variety of instruments to choose from. The best place to start is to determine what information you want to extract from the learning style instrument and what information the instrument will give you. James and Gardner (1995) stated three important factors to consider when selecting a learning style instrument are defining the intended use of the data to be collected, matching the instrument to the most appropriate instrument, and finally, selecting the most appropriate instrument. In addition to that you need to consider the level or classification of the students in which you will assess.

This study will use the Grasha Reichmann Student Learning Style Scale (GRSLSS). Diaz and Cartnal (1999) stated many advantages to the use of the GRSLSS that will benefit and enhance the reliability of the data collected in this study. Namely, the GRSLSS is designed to be delivered to high school and college students, which are the age of this study's target audience. Secondly, the GRSLSS measures the social interaction preferences, which include behavior and attitude tendencies. The study believes that these are important measures to be identified within its subjects.

Summary

With the Revolution in Training sweeping across the U. S. Navy, research should be conducted to see what the effects have been on its' sailors. Achieving an understanding of the sailors' exposure to technology, learning style and educational background should be of the utmost importance to Navy leaders. Each one of these factors can contribute to the success, or failure of its sailors in the training environment.

CHAPTER 3

RESEARCH METHOD

Introduction

This study was conducted to indicate whether basic computer literacy skills are a prerequisite to Naval Engineering Apprentices' success in the Basic Engineering Common Core (BECC) course. Each Naval Engineering Apprentices' learning styles, according to the Grasha Reichmann Student Learning Style Scale (GRSLSS), was also examined to determine if a particular learning style is a predictor of success in the BECC course. The problem of the study was: What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning and are there particular learning styles that favor success in the course?

Description of Research Type

The study employed a descriptive research method which uses quantitative measures to describe *what is*, describing, recording, analyzing, and interpreting conditions that exist (Best & Kahn, 2006). The study utilized different assessment tools to determine; basic computer literacy skills, learning styles, pre-existing naval engineering knowledge, and basic demographic information.

Subjects

The study sample consisted of 121 Naval Engineering Apprentices that entered the Basic Engineering Common Core (BECC) course within a two week period in March

2007. The Apprentices were selected by a means of when they reported to the BECC course. Due to the convenience of when the Apprentices reported to BECC and the fact that each participant must be a volunteer, this was a nonprobability sample and the subjects were selected because they were available during the study. There was no discrimination to gender, race, religion, education, or geographic background. The 121 Naval Engineering Apprentices that participated in the study accurately reflect the overall general population of Naval Engineering Apprentices within the Navy.

Data Collection Instruments

The study utilized data collection instruments to identify the learning styles of Naval Engineering Apprentices. The Grasha-Reichmann Student Learning Style Scale (GRSLSS) (Hruska-Reichmann & Grasha, 1982; Grasha, 1996) was the instrument used to gather this information. The study also employed the BECC course pre-test to determine what the Naval Engineering Apprentice's pre-existing naval engineering knowledge was. As well, the study made use of the *General Computer Operations - Self-Assessment* (*General computer operations: Self-assessment*, 2006) and the *Computer and Internet - Self-Assessment (Computer and Internet: Self-assessment*, 2006), adapted from a Minnesota State Colleges and Universities and University of Minnesota Distance Learning Initiative, to identify baseline basic computer literacy skills of the Naval Engineering Apprentices. Basic demographic information was gathered on a locally generated (by the study) questionnaire that contained questions regarding name, age, gender, geographic location (prior to entering the U.S. Navy), education level, number of computers in the household (prior to entering the U.S. Navy), Internet availability, and computer and Internet usage (prior to entering the U.S. Navy).

Procedures

The study began with an application to the Southern Illinois University Carbondale, Human Subjects Committee to conduct research on human subjects. The application was filed for committee approval in February 2007. The application was returned approved in March 2007.

As the Naval Engineering Apprentices reported for training in the BECC course they were grouped together in an indoctrination classroom were they were told how the course would be conducted. Once indoctrinated into the course, each Naval Engineering Apprentice was given a brief, by the study, on what the reasons for and purposes of the study were. Each Apprentice was asked to participate and those that chose to participate were given consent forms to participate in the study. The consent form further explained the study, what information was going to be gathered, and what their participation in the study would involve. If the Apprentice then elected not to participate in the study, they were dismissed from the classroom and allowed to commence their course of study in BECC. A copy of the consent form is included in the appendix of this study.

Each of the participants was then given the Basic Demographics Survey, the Grasha-Reichmann Student Learning Style Scale (GRSLSS) (Hruska-Reichmann & Grasha, 1982; Grasha, 1996), and the Basic Computer Literacy Skills Self-Assessment (General computer operations: Self-Assessment, 2006; Computer and Internet: Self-Assessment, 2006). The basic computer literacy self-assessment scores can range from

0% to 100%. Finally, each Naval Engineering Apprentice was given a version of the BECC course pre-test to determine the level of naval engineering knowledge prior to starting their course of study. Each module of instruction in the BECC course has a pre-test associated with it. Therefore, pre-tests were given prior to the commencement of each module of instruction within the BECC course. Pre-test scores can range from 0% to 100%. After all survey materials were collected the Naval Engineering Apprentices were allowed to commence their program of study. The Naval Engineering Apprentices were then tracked through the BECC course. Their pre-test and post-test scores were recorded for each module of instruction.

Data Analysis

The data gathered from the Grasha-Reichmann Student Learning Style Scale (GRSLSS) (Hruska-Reichmann & Grasha, 1982; Grasha, 1996) survey allowed grouping of the participating subjects into each of the respective learning style groups: *Independent, Avoidant, Collaborative, Dependent, Competitive, and Participant.* This was done to allow the study to determine if a particular learning style was more predictive of success then another. To determine this, a simple linear correlation (Pearson r) was performed between the subjects learning style and overall grade point average (GPA) in the Basic Engineering Common Core (BECC) course. This data is presented in Table 8 of this study.

The data gathered from the basic computer literacy skills self-assessment allowed the study to group the subjects into one of three groups: Below Average (BA), Average (A), or Above Average (AA). The scores were averaged and a mean was found. A range of values was also determined. The range of values was then divided into three percentiles; lower third percentile, middle third percentile, and upper third percentile. Each percentile was grouped with approximately the same amount of students. Those students grouped in the lower third percentile were considered BA (40 students), those grouped in the middle third percentile were considered A (41 students), and those grouped in the upper third percentile were considered as AA (40 students). Scores in the BA grouped ranged from 12% to 61%. Scores in the A grouped ranged from 62% to 81%. Finally, those students scoring from 82% to 100% were grouped in the AA group.

The study grouped the Naval Engineering Apprentices into three groups which allowed the study to correlate there success in the BECC course as a groups rather then as an individual.

The data gathered from the BECC course pre-test allowed the study to determine the Naval Engineering Apprentices' level of naval engineering knowledge prior to entering each module of instruction of the BECC course. Pre-test scores can range from 0% to 100%.

Finally the study used a regression equation constructed as such; Grade Point Average (GPA) = a + b(Learning Style) + b(Computer Literacy Score) + b(Overall Computer Literacy) (C. K. Waugh, personal communications, May 31, 2007) to determine if the was a correlation between GPA, learning style, and computer literacy. The study also ran a correlation matrix to see how each variable was related to the others.

CHAPTER 4

ANALYSIS OF DATA

Introduction

The problem statement was: What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning and are there particular learning styles that favor success in the course?

The research questions used as the key concern of the study were:

1. What are the current levels of basic computer literacy skills, self assessed, of Naval Engineering Apprentices entering BECC?

2. What are the current levels of Naval engineering knowledge of Naval Engineering Apprentices entering BECC?

3. What benefits exist for Naval Engineering Apprentices to achieve basic computer literacy skills prior to entry into BECC?

4. Which Grasha-Reichmann Student Learning Style is best suited for e-learning as a Naval Engineering Apprentice in the BECC course?

5. Is there a relationship between learning style, computer literacy, and success in the BECC course?

The analysis of data will be presented in two sections: (a) General Data and (b) Research Questions Results.

General Data

All survey materials were distributed during the Basic Engineering Common Core (BECC) Course indoctrination or orientation sessions. Three hundred students were asked to participate in the study. Of the 300 students, 225 agreed to participate in the study. The study experienced a response rate of 54%; that is, 121 surveys were returned completed.

The following statistics were received from the Basic Demographics Surveys returned to the study from the study's sample – Apprentice Engineers entering the BECC course. The study sample consisted of 87% (105) male and 13% (16) females. The female population consisted of 63% (10) white, or white, non-Hispanic, 25% (4) African American, 6% (1) Hispanic, and 6% (1) Asian-Pacific Islander. Male population ethnicity percentages were as follows; 58% (61) white, or white, non-Hispanic, 15% (16) African American, 13% (14) Hispanic, 4% (4) Asian-Pacific Islander, 5% (5) Native Americans, and 4% (4) that indicated, Other, on the Basic Demographics Survey.

Age of the population consisted of 72% (87) between ages 18 and 21, 24% (29) between ages 22 and 25, 2% (3) between ages 26 and 30, and 2% (2) between ages 31 and 40. As the survey indicated, the majority of Apprentice Engineers entering the Navy are coming from the younger generation rather than the older.

Martial status of the population was heavily weighted towards single, 87% (105). With only 12% (15) married, 1% (1) separated and 0% (0) for both divorced and widowed. Also heavily weighted towards one or two responses was the educational level of the population. With 2% (3) having not finished high school, 63% (76) having a high school diploma or General Education Diploma (GED), 29% (35) having some college, 4% (5) having an Associates degree, 2% (2) having a Bachelors degree, and 0% (0) having a Doctoral degree or Professional degree (MD, JD). Alternately, the populations' geographic background was more diverse with 25% (30) from the Southeastern United States, 18% (22) from the Northeastern United States, 26% (32) from the Midwestern United States, 15% (18) from the Southwestern United States, 13% (15) from the Northwestern United States, 0% (0) from Hawaii, 1% (1) from Alaska, 0% (0) from the United States Territories, and 2% (3) other. Of the other locations indicated, West Africa (Togo), Philippines, and South America (Peru) where written in.

The study was based on the idea that computer or Internet usage would factor greatly in the computer literacy levels of the population. Therefore, several computer and Internet questions were asked. Respondents indicated that 60% (72) currently owned a computer and 40% (49) did not currently own a computer. They also indicated that prior to entering the Navy; 42% (51) had 1 computer in the household, 25% (30) had 2 computers in the household, 18% (22) had 3 computers in the household, 12% (14) had 4 or more computers in the household, and 3% (4) had no computers in the household. Of the four respondents that indicated they had no computers in the household, one scored above average (AA) on the computer literacy self-assessment and the other three scored below average (BA) on the computer literacy self-assessment. The study's survey indicated that 18% (22) of the respondents had 5 or more hours of daily computer usage, 25% (30) had 2 to 5 hours of daily computer usage, 31% (38) had 1 to 2 hours of daily computer usage, 22% (26), had less than 1 hour of daily computer usage, and 4% (5) had no computer usage. Of the five with which had *no computer usage*, all five scored below average (BA) on the computer literacy self-assessment.

Internet usage correlated very high with the amount of computer usage; with 16% (19) of the respondents had 5 or more hours of daily Internet usage, 23% (28) had 2 to 5 hours of daily Internet usage, 33% (40) had 1 to 2 hours of daily Internet usage, 25% (30), had less than 1 hour of daily Internet usage, and 3% (4) had no Internet usage. All of the respondents answering *no Internet usage* also indicated that they had no computer usage and each one scored a below average (BA) score on the computer literacy self-assessment. The availability of the Internet to the subjects was; 74% (89) had unlimited access in the home, 15% (18) had limited access in the home, 2% (2) had no access at home, 4% (4) had limited access at school, 3% (3) had limited access at the library, 2% (2) had no access to the Internet, and none of the respondents filled in the *other* block on the survey. Three of the respondents marked more then one block on the survey. Two of those respondents answered that they had limited access at home and limited access at the library, while the other answered that they had limited access at home and limited access at school.

Table 1 displays the computer literacy self-assessment results of the population. The mean scores were used as a central point to then divide the population into the respective categories. A range of values was determined and then divided into three percentiles; lower third percentile which was categorized as the below average (BA) group; middle third percentile which was categorized as the average (A) group; and upper third percentile which was categorized as the above average (AA) group. Each percentile was grouped with approximately the same amount of students. There were 40 students grouped in the lower third percentile, or BA group, 41 students in the middle third percentile, or A group, and 40 students in the upper third percentile or AA group. Scores in the BA grouped ranged from 12% to 61%. Scores in the A grouped ranged from 62% to 81%. Finally, those students scoring from 82% to 100% were grouped in the AA category.

Table 1

Computer Literacy Self-Assessment Results

Measure	Mean	Mode	Median
General Computer Operations Scores	67%	100%	70%
Communications and Internet Scores	68%	81%	72%

Scores were calculated by adding the total from each response and then dividing it by the maximum amount possible per assessment. The General Computer Operations Self-Assessment (*General computer operations: Self-assessment,* 2006) had a maximum of 100 points; 20 questions, 5 points maximum per response and the Communication and Internet Self-Assessment *(Computer and Internet: Self-assessment,* 2006) had a maximum of 65 points; 13 questions, 5 points per response.

As stated by Diaz and Bontenbal (2001), since students possess all of six learning styles on the Grasha-Reichmann Student Learning Style Scale (GRSLSS) to a greater or lesser extent, the study focused on the learning style category in which students scored the highest. This learning style was considered the student’s dominant learning style for the study’s purposes. This enabled the researcher to more accurately determine if a single predominant learning style had a statistically higher rate of success.

Tables 2 shows the comparison of learning style means by category between male and females participants; noting the strong scoring differences between Participant learners and Avoidant learners.

Table 2

Comparison of Learning Style Means by Category

Category	Male	*n*	Female	*n*
	(*n* = 105)		(*n* = 16)	
Independent	3.50	10	3.39	-
Avoidant	2.62	5	2.29	-
Collaborative	3.76	46	4.07	9
Dependent	3.72	6	3.68	-
Competitive	3.07	22	2.82	1
Participant	3.94	16	4.28	6

Note. Learning style scores are based on a five-point Likert scale that ranges from strongly disagree (rating of 1) to strongly agree (rating of 5).

While learning style preferences were spread among the six different learning styles in the male population, the female population was narrowed to only three of the six categories. Table 2 also explains the distribution of the different learning styles by gender.

Research Question Results

Research Question 1

What are the current levels of basic computer literacy skills, self assessed, of Naval Engineering Apprentices entering BECC?

Table 1 shows the overall statistics from the population, with regards to their computer literacy self-assessment scores. The General Computer Operations Self-Assessment scores ranged from 9% to 100%, while the Communications and Internet Self-Assessment scores ranged from 15% to 100%. A score, on either assessment, of 40% would indicate that the Apprentice has only sufficient knowledge to perform basic tasks only; a score of 60% would indicate that the Apprentice has good, adequate knowledge for most tasks; and a score of 80% would indicate that the Apprentice is very proficient and can come up with new solutions; and a score of 100% indicates that the Apprentice is an expert, able to teach others (*General computer operations: Self-assessment*, 2006; *Computer and Internet: Self-assessment*, 2006). The majority of the population, 86% (104) on the General Computers Operations Self-Assessment and 88% (107) on the Communication and Internet usage Self-Assessment scored above 40%.

Research Question 2

What are the current levels of Naval engineering knowledge of Naval Engineering Apprentices entering BECC?

Each Naval Engineering Apprentice is pre-tested and post-tested in each of the modules of instruction in the BECC course. These scores can help to determine if the student can bypass the module of instruction with previous knowledge (score of 95% or better on the pre-test), determine the overall knowledge gain of the student for that module of instruction, and to determine the effectiveness of the course's content. Table 3 shows the relations between the pre and post test scores and knowledge gained in each module of instruction. Scores are given in percentages and can range from 0% to 100%. Scores are obtained by dividing 100 by the number of questions in each test and then multiplying that number by the number missed and finally subtracting that from 100.

Table 3

Average Pre and Post-test Score Comparisons on BECC Modules of Instruction

Module of Instruction	Pre-test	Post-test	Knowledge Gain
Module 1	47.83%	78.81%	30.98%
Module 2/3	51.83%	72.54%	20.71%
Module 4/5	47.61%	76.20%	28.59%

Note. A score of 95% or higher is required to pass the pre-test while the post-test requires a score of 70% or better to pass.

These scores indicated that the Apprentices entering the BECC course had some baseline knowledge of Naval Engineering but, the knowledge gained in the course, indicated that there is a necessity for the course.

Only 46% (56) of the students completed the BECC course without a module post-test failure. Failure of only one test was accomplished by 31% (38) of the students; failure of 2 tests was accomplished by 14% (17) of the students; and failure of all three tests was accomplished by 4% (5) of the students. All module post-tests required a score of 70% or better in order to complete the module successfully. If the module post-test was failed, students were allowed a re-test on the objectives that were missed. Even if the student answered all failed objectives correctly a minimum passing grade of 70% was recorded for the module post-test.

Research Question 3

What benefits exist for Naval Engineering Apprentices to achieve basic computer literacy skills prior to entry into BECC?

Tables 4-7 indicate the benefits that exist for Naval Engineering Apprentices to achieve basic computer literacy skills prior to entry into the BECC course. Table 4 points out that the average scores per computer literacy category were fairly even across all categories.

Table 4

Computer Literacy Category versus Success (GPA) in BECC

Computer Literacy Category	Course Average
Above Average (AA)	77.54%
Average (A)	78.26%
Below Average (BA)	77.83%

Note. Grade Point Averages (GPA) were calculated by averaging the post module test scores of each module, per individual, in each computer literacy group.

Tables 5-7 more specifically point out how each computer literacy group performed in regards to BECC post module test failures. A post module test failure represents a score below 70% on the post module test. Each group experienced approximately the same rate of failure as the other. However, the BA group did experience the lowest number of students who failed the post module test two or three times.

Table 5

Test Failures to Computer Literacy Category Comparison-AA Group

Test Failures	Number of Students in Category
None	16
One	15
Two	6
Three	1

Note. There were 40 students in the AA group. Two were academically dropped from the course.

Contrary to expectations, those students that were categorized in the Below Average (BA) computer literacy group did not experience any students that were academically dropped from the course. Each student was given a chance to retest on the failed objectives. If the retest was failed they would then repeat the module of instruction and be administered a complete post module test. In total there were four students that were academically dropped from the BECC course. Of the four students, three of them were dropped in Module 1 and the other in Module 2.

Table 6

Test Failures to Computer Literacy Category Comparison-A Group

Test Failures	Number of Students in Category
None	20
One	10
Two	7
Three	1

Note. There were 41 students in the A group. Two were academically dropped from the course.

Table 7

Test Failures to Computer Literacy Category Comparison-BA Group

Test Failures	Number of Students in Category
None	18
One	12
Two	3
Three	2

Note. There were 40 students in the BA group. None were academically dropped from the course.

Research Question 4

Which Grasha-Reichmann Student Learning Style is best suited for e-learning as a Naval Engineering Apprentice in the BECC course?

Table 8 indicates the comparison of the Grasha-Reichmann Student Learning Style scales and their respective grade point averages (GPA) in the BECC course. There was no specific learning style that scored better than the other. Although there was only a difference of 2.37% between the highest and lowest scoring learning style, they were indicative of the explanations given by Grasha in his book, *Teaching with Style*.
The Independent learners, which prefer to work alone and requires little direction from the teacher (Grasha, 96), had the highest course average and Dependent learners which, view teacher and peers as sources of structure and support and look to authority figures for specific guidelines on what to do (Grasha, 96), were the lowest scoring group.

Table 8

Comparison of Learning Styles versus Success (GPA) in BECC

Learning Style	Course Average
Independent	79.63%
Avoidant	79.60%
Collaborative	77.31%
Dependent	77.26%
Competitive	79.31%
Participant	77.91%

Table 9 reports the average computer literacy score for each learning style. Predictably, the Dependent learners were the lowest scorers and unpredictably, were the significantly higher scores of the Participant learners. Participant learners are learners who enjoy going to class and take part in as much of the course activities as possible (Grasha, 1996). These scores were unusual because the BECC course does not offer much in the way of activities for the learner to participate in.

Table 9

Comparison of Learning Style and Computer Literacy Scores

Learning Style	Computer Literacy Average
Independent	64.95%
Avoidant	65.50%
Collaborative	65.14%
Dependent	64.83%
Competitive	65.46%
Participant	78.70%

Research Question 5

Is there a relationship between learning style, computer literacy, and success in the BECC course?

Tables 10-12 show the relationships between learning style, computer literacy, and success in the BECC course. The study also used a regression equation constructed as such; Grade Point Average (GPA) = a + b(Learning Style) + b(Computer Literacy

Score) + b(Overall Computer Literacy) (C. K. Waugh, personal communications, May 31, 2007) to determine if the was a correlation between GPA, learning style, and computer literacy. With this regression model, only 1.6% of the variance in GPA was explained by the 3 variables. This is a very small number.

Table 10

Comparison of Learning Style, Computer Literacy Group AA, and GPA in BECC

Learning Style	Number of Students	GPA
Independent	3	75.47%
Avoidant	1	73.86%
Collaborative	20	76.51%
Dependent	1	80.24%
Competitive	4	80.99%
Participant	11	76.00%

Note. One student in the Collaborative group and one student from the Participant group were academically dropped from the course.

In other words, none of these variables appear to be related to GPA. The study also ran a correlation matrix to see how each variable was related to the others. Not surprisingly, only *General Computer Operations - Self-Assessment* scores (*General computer operations: Self-assessment,* 2006) and *Computer and Internet - Self-Assessment* scores *(Computer and Internet: Self-assessment,* 2006), were correlated with a medium degree of positive correlation (r = .562) (Phillips, 1997).

Table 11

Comparison of Learning Style, Computer Literacy Group A, and GPA in BECC

Learning Style	Number of Students	GPA
Independent	3	82.48%
Avoidant	3	82.70%
Collaborative	14	76.77%
Dependent	3	75.16%
Competitive	11	74.86%
Participant	7	75.94%

Note. Two students in the Competitive group were academically dropped from the course.

Table 12

Comparison of Learning Style, Computer Literacy Group BA, and GPA in BECC

Learning Style	Number of Students	GPA
Independent	4	80.62%
Avoidant	1	76.05%
Collaborative	21	76.42%
Dependent	2	78.91%
Competitive	8	77.18%
Participant	4	77.46%

Note the higher grade point averages (GPA) of the Independent learners in all computer literacy categories except Above Average (AA). This trend was expected to occur in all categories. It is unusual that the AA group scored five or more percentage points below the other categories. Independent learners are characterized as being ones who like to think for themselves and are confident in their learning abilities (Grasha, 1997), which should succeed in an online, self-paced e-learning course such as BECC.

Table 13 reports the correlations between the average computer literacy scores and the average grade point average (GPA) per learning style category. Only three of the learning styles showed any degree of correlation.

Table 13

Correlations of Computer Literacy and GPA per Learning Style

Learning Style	*n*	Correlation
Independent	10	-.303
Avoidant	5	.048
Collaborative	54	-.063
Dependent	6	-.435
Competitive	21	.313
Participant	21	.014

Note. Students dropped from the course (4) were not calculated in this table.

CHAPTER 5

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The problem statement was: What are the benefits of teaching basic computer literacy skills to students enrolled in Naval Engineering Apprentice School e-learning and are there particular learning styles that favor success in the course? The students that enter Naval Engineering Apprentice training have diverse educational and technological backgrounds. Specifically, Naval Engineering Apprentices may lack the required basic computer literacy skills needed in order to be successful in BECC. Each trainee will be required to complete more than 100 individual topics, in an e-learning environment while enrolled in the Basic Engineering Common Core (BECC) course. Without these basic computer literacy skills the Naval Engineering Apprentice may become demotivated and their learning experience may be hindered. As well, they may not be situated to excel in their careers after they graduate BECC and continue on with their naval careers. On either account, it is important to remember that no matter what the computer literacy level of the Naval Engineering Apprentice, improving their computer literacy level will always be a factor in online courses (Shelton, 2000).

Table 1 reported that the average overall General Computer Operations Score and Internet Usage scores were 67% and 68%, respectively. This indicated to the study that there existed a good adequate level to a very proficient level of computer literacy (*General computer operations: Self-assessment*, 2006; *Computer an Internet: Self-assessment*, 2006) amongst the Naval Engineering Apprentices entering the BECC course. These scores and the Naval Engineering Apprentices' knowledge gained levels supported the definitions of computer literacy as defined by the U.S. Department of Education (1996) and McKay (2006).

In the Gee (1990) study it was discovered that the more independent and conceptual learning styles had the highest average scores of the student achievement areas measured. Although the margin was small; all learning styles were within 2.37% of each other, the outcomes of this study support Gee's discovery. The independent learners were more successful than any other learning style. This data is reported in Table 8 of this study.

By the results reported in Tables 11-13 there is no evidence to support the notion that students with low computer literacy levels will experience a lower success rate then those with high computer literacy levels. As reported by Table 9, there is also no support for the notion that a certain Grasha-Reichmann Student Learning Style will have a better rate of success then another in the BECC course.

With the evidence reported in Tables 8-13, specifically noting the results in Table 13, the study found that no solid conclusions can be made about the correlations between learning style, computer literacy level, and success in the BECC course and that there is no correlation between learning style, computer literacy level, and success in the BECC course.

In a study by Shelton (1999) it was stated that it would be beneficial to the student to identify their computer performance level prior to enrollment in an online class for the first time. This study concluded that this statement was contradictory to the Naval Engineering Apprentices entering into the BECC course.

Findings

Findings of the study were collected to answer the five research questions posed. The studies population consisted of 121 Naval Engineering Apprentices entering the Basic Engineering Common Core (BECC) course in which 105 were male and 16 were female. The majority of the population was between the ages of 18 and 21 years of age, single, and had unlimited Internet access in the home. Only four of the participants had no computers in the household prior to entering the Navy. The majority of the participants were also high school graduates. There were more White participants then any other ethnicity.

The average computer literacy score by the population was 68%. The study considered anyone scoring above 50% to have a basic general understanding of computers and should be able to perform most basic computing tasks. These students should have no troubles in navigating their way through the BECC course. Those that scored above 75% would be considered as having a good understanding of computer operations and should be able to perform all basic tasks and some detailed level tasks on a computer. The majority of the population (79%) scored 50% or above on the computer literacy self-assessment.

Markedly the lowest scoring subject on the computer literacy self-assessment had the third highest rate of success in the BECC course with a GPA of 89.26%. No subject in the Below Average (BA) category was academically dropped from the course. Of the four subjects academically dropped from the course, there were two in each the Average (A) and Above Average (AA) categories. Of the highest scoring subjects, scores from 90% to 100%, on the computer literacy self-assessment two subjects were academically dropped from the course and the groups combined GPA was that of 69.78%, which is below the course minimum. The subject with the highest GPA (93.97%) was also in this group.

The study identified that there is a medium degree of positive correlation (Phillips, 1997) between computer usage and computer literacy score and Internet usage and computer literacy score (r = 0.5621). Also identified was the low degree of positive correlation (Phillips, 1997) between Internet availability and computer literacy score (r = 0.3667). There were no other significant correlations found between computer literacy level, learning style, and success in the BECC course.

The Grasha-Reichmann Student Learning Style Scale (GRSLSS) administrated by the study revealed that there were 10 subjects categorized as being an Independent learner, 5 subjects categorized as being an Avoidant learner, 55 subjects categorized as being a Collaborative learner, 6 subjects categorized as being a Dependent learner, 23 subjects categorized as being a Competitive learner, and 22 subjects categorized as being a Participant learner.

Table 4 reports that there is a minimal pre-existing, but unacceptable, level of naval engineering knowledge in the students entering the BECC course. However, it also reports that the knowledge gained by the students is significant and consequently warrants the BECC course.

Conclusions

While the Below Average (BA) category of the computer literacy scores ranged from a low of 12% to a high of 60%, 16 of the 40 subjects, in this category, still scored above the 50% mark. A mark considered by the study to where the subject has a basic general understanding of computers and should be able to perform most basic computing tasks. With a total of 80% (97) of the subjects scoring above 50% there appears to be a good base level of computer and Internet knowledge in the Naval Engineering Apprentices entering the BECC course.

With a medium degree of positive correlation (Phillips, 1997) between computer literacy and Internet usage (r = 0.560) the study concluded that the majority of the subjects entering the BECC course have the prerequisite computer and Internet skills to be able to complete the e-learning modules of instruction successfully without any additional computer or Internet training. The study also concluded that there is no correlation (Phillips, 1997) between computer literacy level and success in the BECC course (r = 0.028) and that there is no correlation (Phillips, 1997) between a particular learning style, as determined by the GRSLSS, and success in the BECC course (r = -0.103).

Although the Naval Engineering Apprentices entering BECC display a small degree of naval engineering knowledge, as shown in Table 4, there is still a need for the BECC course to exist. The knowledge gained in the BECC course brings the Naval Engineering Apprentice's knowledge level up to that of an acceptable standard, above 70%.

Finally, the study concluded that there is no correlation (Phillips, 1997) between learning style, computer literacy, and success in the BECC course.

Recommendations

Based on the findings of this study, the following recommendations are offered.

1. Additional computer skills training would not provide the Naval Engineering Apprentices entering the BECC course any added benefit in their rate of success in the BECC course and would only increase the amount of training time needed for the Apprentice to complete the BECC course.

2. Determining the Naval Engineering Apprentice's learning style prior to commencement of the BECC course would not benefit the Apprentice in their rate of success, nor would it allow staff members any additional information as to which Apprentice needs supplementary attention during the course and would only create additional man-hours for the staff of the BECC course to complete.

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APPENDICES

Dear Military Student,

I am a graduate student seeking my Master's degree in the College of Education at Southern Illinois University Carbondale.

The purpose of the enclosed surveys is to gather information about the Apprentice Engineers that enter into the Basic engineering Common Core (BECC) course. The study is to determine if computer literacy skills are a prerequisite to success in the BECC course.

The surveys will take approximately 30 minutes to complete. All your responses will be kept confidential within reasonable limits. Only people directly involved with the study will have access to the surveys.

Your name and social security number will be used to identify your responses on the surveys and track your progress through the BECC course. Once the study has retrieved the data from the surveys and your grades from the BECC database your names and social security numbers will be destroyed by means of shredding. No personal information will be disclosed outside of this study.

Signature below and completion and return of these surveys indicate voluntary consent to participate in the study.

Questions about this study can be directed to me or to my supervising professor, Dr. Beth Freeburg, Department of Workforce Education and Development, SIUC, Carbondale, IL 62901-4605*.
Phone (618) 453-1939 (* 4-digit SIU mailcode)

Thank you for taking the time to assist me in this research.

MMC (SW/AW) Jerry Skirvin
847-688-6812
jerry.skirvin@navy.mil

Print Name Signature Date

This project has been reviewed and approved by the SIUC Human Subjects Committee. Questions concerning your rights as a participant in this research may be addressed to the Committee Chairperson, Office of Research Development and Administration, SIUC, Carbondale, IL 62901-4709. Phone (618) 453-4533. E-mail: siuhsc@siu.edu

Name ___________________ Last 4 SSN _______ Date _______

1) Are you Male or Female?
   - ☐ Male
   - ☐ Female

2) What is your age?
   - ☐ 18-21
   - ☐ 22-25
   - ☐ 26-30
   - ☐ 31-40

3) What is the highest level of education you have completed?
   - ☐ Less than High School
   - ☐ High School/GED
   - ☐ Some College
   - ☐ 2-Year College Degree (Associates)
   - ☐ 4-Year College Degree (BA,BS)
   - ☐ Master's Degree
   - ☐ Doctoral Degree
   - ☐ Professional Degree(MD,JD)

4) Where is your home of record?
   - ☐ Southeastern US (FL, AL, GA, SC, NC, MS, LA, VA, WV)
   - ☐ Northeastern US (MA, VT, CT, NY, PA, RI, DE, ME, DC, MD)
   - ☐ Midwestern US (TX, OK, IL, IN, AR, IA, MO)
   - ☐ Southwestern US (CA, NM, NV)
   - ☐ Northwestern US (WA, OR, UT, ID)
   - ☐ Hawaii
   - ☐ Alaska
   - ☐ US Territory - _________________
   - ☐ Other - _________________

5) What is your current marital status?
   - ☐ Single, Never Married
   - ☐ Married
   - ☐ Separated
   - ☐ Divorced
   - ☐ Widowed

6) What is your race?

- ☐ White
- ☐ White, non-Hispanic
- ☐ African-American
- ☐ Hispanic
- ☐ Asian-Pacific Islander
- ☐ Native American
- ☐ Other

7) How many computers where is your household prior to entering the Navy?

- ☐ 1
- ☐ 2
- ☐ 3
- ☐ 4 or more

8) Do you currently own a computer?

- ☐ Yes
- ☐ No

9) What was the availability of the Internet, prior to entering the Navy?

- ☐ Unlimited access in the home
- ☐ Limited access in the home
- ☐ No access at home
- ☐ Limited access at school
- ☐ Limited access at the Library
- ☐ No access to the Internet
- ☐ Other - ________________

10) How often did you use a computer, prior to entering the Navy?

- ☐ 5 or more hours per day
- ☐ 2-5 hours per day
- ☐ 1-2 hours per day
- ☐ less than 1 hour per day
- ☐ No computer usage

11) How often did you use the Internet, prior to entering the Navy?

- ☐ 5 or more hours per day
- ☐ 2-5 hours per day
- ☐ 1-2 hours per day
- ☐ less than 1 hour per day
- ☐ No Internet usage

General Computer Operations and Communications and Internet Self-Assessment

Adapted from MnSCU/U of M Distance Learning Initiative

Name ___________________ **Last 4 SSN** _______ **Date** _______

Rate your skills in each area:
0 = no ability **1** = very limited ability **2** = sufficient for basic tasks only **3** = good, adequate for most tasks **4** = very proficient (can come up with new solutions) **5** = expert (can teach it to others)

Individuals should be able to use the computer to:

- Perform elementary tasks, such as:
  - _ Perform the boot process _____
  - _ Perform virus protection and scan _____
  - _ Install software from disk or CD-ROM _____
  - _ Create folders and subdirectories _____
  - _ Create and use filenames and extensions _____
  - _ Search for files and directories _____
  - _ Print selected pages _____
  - _ Find answers to questions using on-line HELP feature _____
  - _ Create page setup (e.g. page orientation, columns) _____

- Manipulate files, including such tasks as:
  - _ Retrieve files _____
  - _ Copy, move, delete files _____
  - _ Back-up files _____
  - _ Use auto-save _____
  - _ Organize files in subdirectories/folders _____
  - _ Import and export files _____

- Perform disk operations, such as:
  - _ Format diskettes _____
  - _ Copy diskettes _____
  - _ Write-protect diskettes _____

- Access a network (e.g. printer, intranet):
  - _ Print a document on a network printer _____

- Use keyboard for data and program entry:
  - _ correctly place fingers on the HOME keys and navigate appropriately from there to other keys _____

General Computer Operations and Communications and Internet Self-Assessment

Adapted from MnSCU/U of M Distance Learning Initiative

Rate your skills in each area:

0 = no ability **1** = very limited ability **2** = sufficient for basic tasks only **3** = good, adequate for most tasks **4** = very proficient (can come up with new solutions) **5** = expert (can teach it to others)

Individuals should be able to use e-mail and the Internet to communicate and located information. This would include the ability to:

- Use e-mail to:

  - send and receive e-mail messages _____
  - enclose and recover documents attached to e-mail messages _____

- Use the Internet to:

  - access the Internet with a browser _____
  - navigate the Web by use of links and URL addresses _____
  - use search engines to locate desired information _____
  - download and print desired items from the Internet _____
  - use listservs _____
  - access and contribute to chat rooms and newsgroups _____
  - recognize appropriate use of listservs, chat rooms, newsgroups _____
  - create World Wide Web pages _____
  - use a Web Publishing tool _____
  - organize and moderate a synchronous computer conference using a chat tool _____
  - use e-mail, newsgroups, listservs, and WWW to support class communication _____

Grasha-Reichmann Student Learning Style Scales

Name _________________________ Last 4 SSN _______ Date _______

THE FOLLOWING QUESTIONNAIRE HAS BEEN DESIGNED TO HELP YOU CLARIFY YOUR ATTITUDES AND FEELINGS TOWARD LEARNING IN SCHOOL. THERE ARE NO RIGHT OR WRONG ANSWERS TO EACH QUESTION. HOWEVER, AS YOU ANSWER EACH QUESTION, FORM YOUR ANSWERS WITH REGARD TO YOUR GENERAL ATTITUDES AND FEELINGS TOWARD ALL OF YOUR COURSES.

Respond to the items listed below by using the following scale.

Use a rating of 1 if you *strongly disagree* with the statement.
Use a rating of 2 if you *moderately disagree* with the statement.
Use a rating of 3 if you are *undecided*.
Use a rating of 4 if you *moderately agree* with the statement.
Use a rating of 5 if you *strongly agree* with the statement.

---

1. I prefer to work by myself on assignments in my courses.

2. I often daydream during class.

3. Working with other students on class activities is something I enjoy doing.

4. I like it whenever teachers clearly state what is required and expected.

5. To do well, it is necessary to compete with other students for the teacher's attention.

6. I do whatever is asked of me to learn the content in my classes.

7. My ideas about the content are often as good as those in the textbook.

8. Classroom activities are usually boring.

9. I enjoy discussing my ideas about the course content with other students.

10. I rely on my teachers to tell me what is important for me to learn.

11. It is necessary to compete with other students to get a good grade.

12. Class sessions typically are worth attending.

13. I study what is important to me and not always what the instructor says is important.

14. I very seldom am excited about material covered in a course.

15. I enjoy hearing what other students think about issues raised in class.

16. I only do what I am absolutely required to do in my courses.

17. In class, I must compete with other students to get my ideas across.

18. I get more out of going to class than staying at home.

19. I learn a lot of the content in my classes on my own.

20. I don’t want to attend most of my classes.

21. Students should be encouraged to share more of their ideas with each other.

22. I complete assignments exactly the way my teachers tell me to do them.

23. Students have to be aggressive to do well in courses.

24. It is my responsibility to get as much as I can out of a course.

25. I feel very confident in my ability to learn on my own.

26. Paying attention during class sessions is very difficult for me to do.

27. I like to study for tests with other students.

28. I do not like making choices about what to study or how to do assignments.

29. I like to solve problems or answer questions before anyone else can.

30. Classroom activities are interesting.

31. I like to develop my own ideas about course content.

32. I have given up trying to learn anything by going to class.

33. Class sessions make me feel like a part of a team where people help each other learn.

34. Students should be more closely supervised by teachers on course projects.

35. To get ahead in class, it is necessary to step on the toes of other students.

36. I try to participate as much as I can in all aspects of a course.

37. I have my own ideas about how classes should be run.

38. I study just hard enough to get by.

39. An important part of taking courses is learning to get along with other people.

40. My notes contain almost everything the teacher said in class.

41. Being one of the best students in my classes is very important to me.

42. I do all course assignments well whether or not I think they are interesting.

43. If I like a topic, I try to find out more about it on my own.

44. I typically cram for exams.

45. Learning the material is a cooperative effort between students and teachers.

46. I prefer class sessions that are highly organized.

47. To stand out in my classes, I complete the assignments better than other students.

48. I typically complete course assignments before their deadlines.

49. I like classes where I can work at my own pace.

50. I would prefer that teachers ignore me in class.

51. I am willing to help out other students when they do not understand something.

52. Students should be told exactly what material is to be covered on the exams.

53. I like to know how well other students are doing on exams and course assignments.

54. I complete required assignments as well as those that are optional.

55. When I don’t understand something, I try to figure it out for myself.

56. During class sessions, I tend to socialize with people sitting next to me.

57. I enjoy participating in small group activities during class.

58. I like it when teachers are well organized for a session.

59. I want my teachers to give me more recognition for the good work I do.

60. In my classes, I often sit toward the front of the room.

Scoring Key

1) Copy your responses from the sheet of paper with your ratings on it to the space provided below for each item.

LEARNING STYLE TEST ITEMS

1._____.	2._____.	3._____.	4._____.	5._____.	6._____.
7._____.	8._____.	9._____.	10._____.	11._____.	12._____.
13._____.	14._____.	15._____.	16._____.	17._____.	18._____.
19._____.	20._____.	21._____.	22._____.	23._____.	24._____.
25._____.	26._____.	27._____.	28._____.	29._____.	30._____.
31._____.	32._____.	33._____.	34._____.	35._____.	36._____.
37._____.	38._____.	39._____.	40._____.	41._____.	42._____.
43._____.	44._____.	45._____.	46._____.	47._____.	48._____.
49._____.	50._____.	51._____.	52._____.	53._____.	54._____.
55._____.	56._____.	57._____.	58._____.	59._____.	60._____.

2) Sum your ratings for each column and place them in the spaces below

._____.	._____.	._____.	._____.	._____.	._____.

3) Divide your total score for each column by 10 and place your answer in the spaces below

._____.	._____.	._____.	._____.	._____.	._____.
Independent	Avoidant	Collaborative	Dependent	Competitive	Participant

4) The names for each learning style associated with each column are shown above.

5) Check whether your score represents a relatively Low, Moderate, or High score based on the norms for each learning style scale shown below.

	Low	Moderate	High
Independent	[1.0-2.7]	[2.8-3.8]	[3.9-5.0]
Avoidant	[1.0-1.8]	[1.9-3.1]	[3.2-5.0]
Collaborative	[1.0-2.7]	[2.8-3.4]	[3.5-5.0]
Dependent	[1.0-2.9]	[3.0-4.0]	[4.1-5.0]
Competitive	[1.0-1.7]	[1.8-2.8]	[2.9-5.0]
Participant	[1.0-3.0]	[3.1-4.1]	[4.2-5.0]

VITA

Graduate School
Southern Illinois University

Jerry D. Skirvin Jr. Date of Birth: January 4, 1971

P.O. Box 886632, Great Lakes, IL 60088

129 Vanderford Road North, Orange Park, FL 32073

Southern Illinois University Carbondale
Bachelor of Science, Workforce Education and Development, December 2005

Thesis Title:
Benefits of Teaching Basic Computer Literacy Skills to Naval Engineering Apprentices

Major Professor: Beth Winfrey Freeburg, PhD.