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An Examination of Trainee Reactions to the Use of Technology in Canadian Naval Occupation Training

by

Regan L. Legassie

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ABSTRACT

The use of technology in training by the Canadian Navy has increased dramatically over the last few years. Simulators and Computer Based Training have been introduced to replace training in actual ships at sea. These changes represent a significant monetary investment and require a dramatic change in the nature of instruction. Therefore, the reactions of trainees and instructors to these changes are an important indicator of effectiveness. By developing and administering a questionnaire to trainees and instructors in two Canadian Navy Training Establishments, this study measures the reactions to the use of training technology. Generally, the results indicate that most trainees view the use of technology in a positive fashion and welcome the adoption of new training technologies. However, there is an indication that implementation of technology and instructor training requires improvement. Suggestions for future study and implications for increased use of training technology are also considered.

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CHAPTER 1

INTRODUCTION

Background

Training has always been vital to the success of military operations. In April 1917, after failures by British and French troops, Canadians were given the task of defeating a dug-in German army at Vimy Ridge. Realizing preparation was essential to success, Canadian Commanders built a mock-up of the battlefield and marched troops over it until they memorized the landscape. Anticipating delays in moving guns and ammunition forward to support the battle, machine gunners were told to learn how to use captured German guns. As a result, the fledgling Canadian Army was able to take the hill in a matter of hours (Morton, 1985). Similarly the success of the June 1944 Allied landings at Normandy has been credited to the foresight of Eisenhower and Montgomery for ordering practice of joint operations and amphibious landings. More recently, British successes in the Falkland Islands campaign of 1982 have been linked to superior training (Turner, 1983). Current weaponry relies heavily on satellites and computer tracking to increase precision and accuracy, but soldiers, sailors and airmen must still be taught how to use these items. Therefore, training remains a vital component of military preparations (Tonning, 1997).

In the Canadian Forces (CF) training is a major component of military spending. Estimates suggest that between 400 million and 1.5 billion dollars of the Canadian Forces budget is allocated to individual training (AATE, 1990). Over the last few years, staff cuts and budget reductions have reduced this figure slightly, but the demands placed on the training system remain the same. In an effort to alleviate some of the strain caused by the demand, many training organizations in the CF have looked to technology as a way to reduce costs and maintain efficiency. While technologies such as computer based training (CBT) and simulators are often able to reduce training time (Bahlis, 1995), the effects of these changes on trainees and instructors are often overlooked.

CF Use of Technology in Training

In 1989, the Canadian Forces Chief of the Defence Staff (CDS) commissioned a major review of CF Individual Training.[1] The importance of the study is reflected in the opening paragraph of the final report:

> The Canadian Forces enjoys a reputation for the high quality of individual training that it provides its members. More importantly, our ability to meet our operational requirements is affected by our competence in designing and conducting individual training. The success of future training efforts will be influenced heavily by our ability to cope with change. (AATE, 1990, p.3)

The Alternative Approaches to Training and Education Study Team (AATE) was mandated to *develop effective implementation strategies for alternative approaches to CF*

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[1] In the CF there are two categories of training – Individual and Collective. Individual Training (IT) is regulated by the Canadian Forces Individual Training and Education System (CFITES) and is divided into three types:

1. ***General Military Training (GMT)***. This is training which is common to all members of the CF. It includes such things as Boot Camp, First Aid Training and any other general or common training given to all CF members.
2. ***Occupation Training (OT)***. Also referred to as Military Occupation Classification (MOC) Training, this training is tied directly to job requirements. For example, MOC Training for Training Development Officers (TDO) includes Basic Officer training (GMT) followed by The Training Development Officer Basic Qualification Course (TDO BQC). On completion of this course a trainee is classed as a trained TDO.
3. ***Occupation Specialty Qualification (OSQ) Training***. This training occurs after MOC Training is completed and is usually related to job function requiring specific skills or knowledge. For example, TDO's are required to serve in positions requiring advanced training in Educational Technology. Therefore, selected candidates attend Graduate school to receive an advanced degree in this field. They are then awarded an OSQ in Educational Technology.

Collective Training deals with operational objectives and tactics and requires the interplay among several Units or Commands. For more information see the Canadian Forces Manual of Individual training, Volume 1 at http://www.dnd.ca/cfites.

training and education ...[and] ... *examine alternative training and education along with requisite CF requirements* (AATE, 1990). The committee concluded that technology would play a large role in the future of training and noted that "*the need to meet expanding training requirements during a period marked by decreasing funds must be the primary incentive to seek innovative approaches.*" Among the innovative approaches suggested was a marked increase in the amount of technology used in occupational training. Items such as CBT and high fidelity simulators (HFS) were advocated as possible alternatives to alleviate the strains on the CF training system (NDHQ Instruction VCDS 04/91).

In the eight years since the AATE study was released, the CF have implemented several changes. First, staffing levels have been reduced from 80,000 to approximately 50,000 regular force members (DND White Paper, 1994). Second, technologically advanced equipment, such as the Air Force's CF-18 Fighter, the Navy's Canadian Patrol Frigate and the Army's Tactical Information Command and Control System, are now commonplace. Finally, the fundamental role of the military within society has changed from deterrence to peacekeeping (Griffiths & Thomas, 1997). Military training has felt the effects of these changes. Declining budgets and fewer personnel have forced many Training Establishments[2] to re-examine the way training is conducted. Technology has played a major role in addressing some of the shortfalls (Mack, 1995). For example, at the Canadian Forces Fleet School Esquimalt (CFFSE) and The Naval Officer Training Centre (NOTC) in Victoria, British Columbia, new and experienced sailors learn their craft with the aid of interactive multimedia, simulators and part task trainers. These

[2] A *Training Establishment* is the CFITES term for a school that conducts Individual Training.

replace past processes that relied heavily on classroom training, equipment mock-ups and extended periods of on-the-job-training (OJT). Similar changes have been felt across all branches of the CF[3]. In the Air Force, pilots spend a large portion of their training hours in a simulator, thus reducing the number of flying hours to a minimum. In the army, artillery and infantry trainees use simulation to learn the craft of firing anti-tank missiles, thus saving expensive ammunition for the final exam, collective training and peacekeeping.

Although these changes are mainly reactions to the economic and resource deficiencies noted earlier, they also reflect the reality of modern warfare. Today's weapons are highly complex and require soldiers, sailors and airmen to posses very specific technological skills in order to perform their jobs on the battlefield (Adams, 1998). As a result, more technology must be used in occupation training. Therefore, determining how trainees react to this increase is crucial to the success of future operations. Any increases in anxiety associated with the new training methods, the presence of technophobia, or poor quality of instruction can have serious ramifications for the operational effectiveness of the Canadian military.

Purpose of the Study

In an extensive review of media use in education and training, Clark and Salomon (1986) indicate that student reactions to instructional media can be influenced by three factors:

1. *Past Experiences*. Trainee reactions to technology will be fashioned by previous exposure to the same or related technologies. For example, a student who has

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[3] The CF is divided into three branches or elements - Land Forces, Navy and Air Force. Each has it's own

primarily negative experiences with computers will have a high anxiety level and low motivation to succeed in courses using CBT. Conversely, students who have had positive experiences with computers are more likely to have low anxiety and high motivation.

2. *Amount of Invested Mental Effort (AIME)*. Salomon (1983, 1984, 1985) and Bentjees (1989) note that certain media appear to evoke different responses from learners. Salomon (1983) states:

   > ...learning in its generic sense, greatly depends on the differential way in which sources of information are perceived, for these perceptions influence the mental effort expended in the learning process. (p.42)

   As an example, in North America, television is associated with leisure activity and therefore it is viewed as a "passive" medium. Textbooks on the other hand, are closely associated with education and learning. Therefore students tend to invest more mental effort when reading, than they do when watching television. However, in Europe, television has a rich history of educational uses. Therefore, in North America, students are more apt to find videotapes and instructional television less appealing than their European counterparts. (Salomon 1984, Beentjes, 1989). Therefore, the reaction to the media used can be measured in terms of the Amount of Invested Mental Effort (AIME).

3. *Novelty Effects*. Often when individuals are exposed to an item for the first time, their curiosity is aroused. They want to determine how it works and compare the results with current methods. However, once the curiosity has been satisfied, they may become less enamored with the item or reject it outright. In training, this *novelty*

Chain of Command, but all fall under the control of the Chief of the Defence Staff (CDS). Budgets are handed to the CDS for distribution among the branches of the CF.

effect can result in high success rates and increased trainee motivation initially, but, over time, the results begin to stabilize or decrease. Therefore, in all instances of technology implementation, the temptation to declare early success must be compared against the long-term results.

With these factors as a guide, this study examines the following question: ***What are the reactions of trainees towards the use of training technology in the Canadian Navy?*** Specifically, the study attempts to determine if technology is perceived by instructors and trainees to have a positive or negative influence on training. Secondary considerations deal with implementation issues and any noticeable gender, age or rank differences. The results of the study will be used to offer suggestions for improving instructional methods, future technology implementation and course design.

Categories of Training Technology

Throughout the course of this study, two terms will be used interchangeably – ***instructional media*** and ***training technology***. In all instances, these two terms will be used to describe *any piece of equipment, with associated materials, that controls through mechanical or electronic means, the presentation of visual or auditory communication for instruction* (Reiser, 1987).

Clark (1994) and Kozma (1994) have debated the merits of various technologies and offered some explanations for their effectiveness (or lack of it). However, to this point, only a few attempts have been made to categorize it (Dale, 1946; Reiser & Gagne, 1992, 1993). As a general rule, technologies employed in training situations have some common characteristics. First, they must be acquired. Costs and availability of technology vary greatly. Some items, such as overhead projectors (OHP) and videocassette recorders (VCR), cost little and can be obtained easily. Other items, such as CBT and simulators must be purchased from custom developers or manufacturers. This limits availability and increases cost. Second, some technologies are easier to operate than others. Many instructors can use a television or VCR because they own them. However, LCD projectors and simulators are not common to everyday use. Therefore they require specific training and outside assistance. Because of this, training technologies will vary in their level of complexity. Finally, not all training technologies are created equal. Some, such as radio or television offer no interaction with the learner, while web based training (WBT) and computer mediated communications (CMC) allow the learner to interact directly with the instructor, other classmates or outside experts, often at the same time. Rogers (1986) calls this process the mode of communication of a technology. While cost is always a key consideration of technology selection, the CF have determined that its use is preferred over actual equipment whenever possible (AATE, 1990; NDHQ Instruction VCDS 04/91). Therefore, cost was not a consideration in this study. The remaining two criteria - complexity and level of interaction – do have implications for reactions and use so they were considerations under study.

To make discussion of results easier, it is possible to group the types of training technology used in the Canadian Forces into the following categories:

1. *Category 1 – Conventional Media*. Includes items normally associated with face to face instruction. Examples include textbooks, overhead projectors, whiteboards, chalkboards, videotapes, film and television. Many of these have been in existence for several years and are widely used in instruction and education. Ease of use and minimal maintenance makes these devices extremely popular.

2. *Category 2 - Presentation Technology*. Evolving from the projection devices listed above, presentation technologies make use of advances in computers and optics. Items such as LCD Projectors, Plasma Displays and SCAN Converters are used in conjunction with display software such as Harvard Graphics or MS PowerPoint and viewed on large screens or television monitors. Their appeal is growing as an instructional medium in business, government and universities.

Items in the first two categories are frequently used in support of instructor led training, although some items such as textbooks and videotapes can be used for self-study purposes.

3. *Category 3 - Multimedia*. Self paced and self-contained instruction usually delivered via a Local Area Network (LAN), Intranets or the World Wide Web (WWW). Trainees are required to log-on to the program and proceed through the courseware. Feedback, evaluation and remediation may be provided throughout. The courseware may be developed in-house or purchased from an external supplier. High start-up costs, complex development cycles and expensive maintenance or upgrades are associated with this category of training technology.
4. *Category 4 - Simulators and Trainers*. Devices in this category have traditionally been associated with aviation training. However, in any field where the use of actual equipment or practices is dangerous, costly or limited, trainers and simulators have been adopted to provide alternative methods of skill development and performance assessment. A trainer may be one of two types - Part Task Trainers (PTT) or High and Low Fidelity Simulators (HFS, LFS). As the name implies, PTTs are devices which train a specific task or process. During the early days of military flight training,

flying by instrument was an important task to master. Since it was costly (and dangerous) to use actual airplanes to teach this to students, instructors employed a device known as the Link Trainer. Designed by an aviator, this device simulated (via pneumatic controls) the requirements of flying by instrument. It was not designed to teach all the skills required of new pilots – instead it concentrated on a very specific set of procedures (Heintzman, 1984). This is the purpose of a Part Task Trainer. It is used to develop specific skills that are later combined with others to form a specific process or sequence of events. The concern is more focused on initial task development than job competence or mastery. In contrast, HF and LF Simulators are more detailed. LF Simulators provide representations similar to, but not an exact replication of actual equipment or scenarios. HF Simulators provide representations that are as close to the real equipment or scenario as is technologically possible. They are often associated with complex training such as Naval Shiphandling or Pilot Training (Legassie, 1994). Unlike a PTT, HF Simulators are designed to offer an immersive training environment. Trainees are able to experience and demonstrate all aspects of the skill set required for proficiency. Furthermore, these devices can be used to assess the competency levels of candidates in advance of transfer to the actual equipment. In general, simulators and PTTs are expensive, require purpose built infrastructures to house them and must be supported by specially trained technical and maintenance staff. As a result, applications are limited to commercial or military aviation and marine sectors. However, their ability to provide the effect of reality at a much cheaper cost and with less risk of harm or injury have initiated research and development efforts across several sectors (Blaiwes, Puig and Regan, 1973; Andrews

1989). Furthermore, recent advances in microcomputer technology have led to the development of PTTs that run on desktop computers, dramatically lowering costs and increasing efficiency through networking (Holmes & Garrity, 1998).

Increasingly CF Training Establishments are adopting technologies from Categories Three and Four. The instructional value of each has been highly reported (Jamison, Suppes and Wells, 1974; Tevor-Deutsch, 1995; O'Neil, Anderson and Freeman, 1986). However, little empirical research documents student reactions to technology used in training. As Clark and Salomon (1986) have indicated, this is an important factor in determining the success of any training technology:

> What the student thinks or believes to be the case about a particular mediated presentation or class of media can come therefore to exert at least as much influence over learning as the medium itself. (p.472)

Justification for the Study

Skinner (1988) outlines three criteria for determining whether or not implementation of training technology has been successful:

1. *Efficacy of the technology*. Is the technology congruent with the objectives of the training or course? Are certain technologies more suitable for specific courses or parts of courses than others?
2. *Cost*. Is the cost of the technology the same as or lower than existing methods? What is the long-term cost?
3. *Attitudes of Students and Staff*. Are students and instructional staff accepting of the new media? Will they accept it as an instructional method/media?

Literature considering the first two items is easy to find. Several studies have outlined the value of Computer Based Training and Simulation in technical and skills training (Andrews, 1988; Stemler, 1997). Cost is always a factor in the design of any new training program and the movement towards Life Cycle Material Management (LCMM) and Business Planning (BP) within the CF has developed procedures to ensure these issues are dealt with in advance of acquisition (Mack, 1995). However, very little research has been done with regard to the third item (Clark & Salomon, 1986). In the Navy, some anecdotal evidence seems to indicate that trainees appear more motivated when a simulator is used to train Navigation and Shiphandling than when they are trained in the actual ship at sea (Williams, 1996). These results could be due to simulation although decreases in the trainee-instructor ratio or improvements in course design may also be responsible. Therefore, it seemed appropriate to conduct a detailed investigation to determine if these results can, at least in part, be attributed to the use of training technology in the Canadian Navy.

Summary

Training occupies an important role in the military. Increased complexity of military hardware and reductions in funding and staffing levels have resulted in the introduction of several new forms of instructional media to the CF Training System. Multimedia and High Fidelity Simulation have seen the largest growth over the last five years, yet very little research has been conducted into how trainees view the introduction of this technology into the training paradigm. Therefore, this study was conducted to begin to answer this question via an analysis of the reactions of trainees and instructors to the technology used in their training.

CHAPTER 2

RELATED LITERATURE

Introduction

Does the use of media improve learning? This question has been asked of film, then radio and television and, over the last few years, computers and the Internet. Unfortunately, the answer remains elusive. Clark (1983, 1994) argues that media *have no effect* on learner outcomes, while Kozma (1994) and Salomon (1983) claim media *can have significant effects* on trainees and play an important role in developing the cognitive processes of the learner. Some writers argue that new technologies can reduce training time, increase trainee motivation and lower overall course costs (Hall, 1997; Tonning, 1997), but these benefits can be offset by consequences such as increased anxiety (Kraut, Patterson, Lundmark, Kiesler, Mukopadhay & Scherlis, 1998) and poor efficiency (Tenner, 1996). Often, implementation issues such as funding for maintenance and hardware upgrades are cited as a key reason for the limited use of new technologies (Kearsley, 1985a). Finally, diffusion research indicates that no matter how much planning and preparation is completed in advance, some innovations will never be adopted (Rogers, 1995). All of this research has important implications for the issues raised throughout this study. Trainee reactions to technology are a combination of several factors – implementation, course design, instructor training and trainee backgrounds. Therefore in order to ensure the necessary data are collected, the results of previous research must be used to develop the research instrument. For ease of reference, the literature related to this topic has been divided into three categories:

1. Evaluation studies of the use of technology in training/education;
2. Research on diffusion and adoption of technology; and
3. Studies of trainee reactions to the use of technology.

At the end of each category, some general themes of the research will be presented followed by the implications of the literature review for the overall study.

Evaluation Studies

In 1922, Thomas Edison remarked that film would change education forever. Textbooks would be replaced by visual images thus increasing the efficiency of the entire educational system (Cuban, 1986). Although very popular in military and industrial training, film did not spark Edison's predicted revolution in the educational sector. Cuban (1986) notes that public education was slow to adopt film as the primary medium of instruction for three very basic reasons – lack of teacher training on projection equipment, scarce supply of films (due to high production costs) and poor relationship of film content to the subject matter. On the other hand, Saettler (1990) details how film helped to revolutionize the field of industrial and military training by affording the opportunity to replicate complex or dangerous tasks and procedures for instructional use. Saettler offered two main reasons why film proved so beneficial to industrial and military training:

1. reductions in training time without a loss of effectiveness; and
2. higher motivation levels of students.

By the end of World War II, several films existed on a wide range of topics and the proven effectiveness of the approach convinced many in the industrial sector of its value. Educators, on the other hand, continued to struggle with the new medium. Teachers were often skeptical of the medium and its effects on student learning and only used them sporadically (Johnston, 1987). One of the reasons for this apparent contradiction may be linked to the different roles assigned to training and education. As Romiszowski (1981) notes:

> ...training is akin to following a tightly fenced path, in order to reach a predetermined goal at the end of it. Education is to wander freely in the fields to left and right of this path –preferably with a map. (p.3)

This is a common theme that seems to run through many of the evaluation studies of instructional media. Many researchers have concentrated on the educational sector with the results aimed at improving public education. However, because several of the technologies evaluated are also used in the CF, there is a need to review these studies and determine what issues are applicable to military training. To make the discussion easier to follow, the studies have been grouped in accordance with the taxonomy noted in Chapter 1.[1]

<u>Category 1 – Conventional Media</u>. Jamison, Suppes and Wells (1974) offered one of the earliest comprehensive reviews of media effectiveness in education. Their meta-analysis (Krathwohl, 1997) examined the literature on traditional classroom instruction (TI), Instructional Radio (IR), Instructional Television (ITV) and Programmed Instruction (PI). With regards to TI, they discovered that contrary to current belief, student-to-teacher ratios have little influence over increases or decreases in student learning (however, they did note that small class sizes tended to benefit young children). Most of the other conclusions about TI were related to the importance of Socio-Economic

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[1] Category 2 technologies are not covered in this section because many of these items simply build upon principles from Category 1. Therefore, very little research has been conducted into their effects in the classroom.

Status (SES) on student learning and school resources. Their review of the research on IR produced results similar to those noted above – if properly supplemented with visuals (i.e. pamphlets, handouts or texts) radio is as effective as face to face instruction. As for ITV, Jamison, Suppes and Wells concluded that it was as effective as traditional instruction based on past research, although it appeared to be most effective in elementary school. They did note that some of the ambiguous results associated with ITV might be associated with its perception as an entertainment medium rather than an educational tool - a point later reinforced by Salmon (1984), Postman (1985) and Beentjes (1989). In brief, Jamison, Suppes and Wells (1974) concluded that *students learn effectively from all these media, and relatively few studies indicate a significant difference in one medium over another or one variant of a medium over another.* (p.55)

Likewise, Cuban (1986) reviewed the use of technology in American Classrooms from 1920 onward. He concluded that technology (or media) use in the classroom has been spotty and disorganized. Like Jamison et al. he found that many of the technologies used in the classroom are just as effective as traditional instruction, but notes that the value of the technology rests with the attitude of the teacher:

> Teachers have altered their practice when a technological innovation helped them do a better job of what they already decided had to be done and matched their view of daily classroom realities. (p.66)

Cuban calls this Situationally Constrained Choice. His research indicates that a technology will only succeed if it can be used to address a particular problem in the classroom. If special procedures or re-organizations are required to incorporate the technology into instruction, the device will never achieve widespread adoption.

Cuban offers four guidelines for ensuring success of technology use, and although, based on research conducted in educational settings, all are relevant to the situations found in military training:

1. Accessibility of Hardware and Software. Lack of programs, complexity of equipment and general logistical programs associated with equipment set-up and maintenance must be alleviated for instructors to accommodate the new technology.
2. Effective Implementation Planning. Many of the innovations Cuban studied failed because they were top down innovations with little or no consultation of the classroom teachers. Furthermore, teachers often received no training on the equipment but were told to use it effectively in their classrooms. To be effective however, the new technology must have a clear plan and be related to a specific task in the classroom.
3. Organization of the School/Classroom. Cuban discovered that one of the main reasons why ITV was not well accepted in high schools was the organization of the class. Many classes were 50 minutes in duration and often started or ended off-hour. Since television programs are broadcast around top and bottom of the hour schedules, their use was limited. He also discovered similar problems with radio and films that were longer than 30 minutes. Therefore, he asserted that unless the new technologies accommodate the structure of the classroom and school, they would not be effective tools.
4. Teacher Training and Professional Development. Cuban's research revealed that one of the main contributors to the lack of support for media in education was the nature of teacher training. Because current practitioners train new teachers, existing patterns and beliefs are often reinforced. Furthermore, films and television are viewed as "time-fillers" and have a low instructional value within existing practices. Therefore,

if technology implementation is to be effective, he suggests that more emphasis be placed on its uses and advantages during initial teacher training and followed up with extensive Professional Development for those already in the classroom.

Johnston (1987) used a similar approach to offer suggestions about the effectiveness of instructional media. His conclusions about instructional radio and television were the same as the research reported above – all are at least as effective as conventional instruction, though each does have some beneficial uses.[2] Johnston claims that the effectiveness of electronic media is related to two factors – the medium itself and the programming. Its characteristics and availability will dictate the value of the medium to the instructional process. In other words, if the technology is simple to use and readily available it will appeal to educators and trainers; conversely, a technology with a high level of complexity and scarce resources will often be ignored. Secondly, even though technology may be readily available and easy to use, its use is also dependent upon the programming – the instructional strategies, the content and the motivational elements. In fact, Johnston argues that these may be more important than the medium itself. Furthermore his research indicates that, of the three types of technologies used in classrooms – Passive Linear Technologies, Interactive Communication Technologies and Interactive User Command and Control Technologies[3] – those that offer the user the most

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[2] For example, he notes that past research on radio indicates it is very effective when instruction focuses on aural comprehension. In particular, it appears to have beneficial results for classes in music appreciation and recognition and for training in language pronunciation and enunciation. Similarly, television seems to be most effective when it is used in concert with classroom discussions. Such uses would include instruction designed to change attitudes or beliefs. He does however note the value of educational television such as *Sesame Street* and *The Electric Company* in changing attitudes of teachers towards television as an effective medium of instruction. For more information see Johnston (1987) Chapters 2 and 3.

[3] Passive Linear Technologies are one way technologies in which the user no control over reception (radio and TV). Interactive Communication Technologies allow the user the possibility of exchanging oral or video information with other users electronically (audio and videoconferences). Interactive User Command

control over the presentation and comprehension of the content appear to be the most effective. Like Cuban, Johnston offered some suggestions for improving the effectiveness of training technology:

1. The Software. This is defined as the radio or television program or the programming of the CBT and CAI. In order to succeed, it must relate to an existing need and meet the goals of the course.
2. The Hardware. It must be easy to use, available and suitable for learner use in the classroom. Cost and technical requirements can also affect this category.
3. Learner Characteristics. If the content is new to the learner, structured instruction is most effective. If the learner has previous experience with the content, unstructured presentations may be more effective. This supports the high usage rates associated with the high use of video and CBT for refresher training in the CF.
4. Context and the Learners' Mindset. Simply put, this is the learner's reaction to the technology. If the learner views the technology as helpful to the instruction, it will be effective. If not, the training value will be limited.

Deficiencies in any of these categories will limit the value and effectiveness of a technology during instruction.

Category 3 – Multimedia. Hawkins (1996) observes that the biggest disappointment in education this century has been the inability of technology to bring about a switch from the traditional broadcast model of instruction (Tapscott, 1997) to a more student centered, discovery based approach to learning. In contrast to the shortcomings of film, radio and television in achieving this goal, Dwyer (1996) remarks

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and Control allow the user command over what is stored in the medium, whether it be information or that the microcomputer offers the best hope of achieving this switch. Unlike the other three technologies, computers facilitate an important criterion for effective instruction – interaction. A computer can ask a student to select a response to a question, provide feedback on the answer and offer a series of options based on that answer (i.e. remedial instruction, more testing, or introduction of new material). Film, radio and television cannot. As a result, they were relegated to the corner of the classroom and limited to sporadic and often ineffectual usage.

Kearsley (1985b) identifies five applications of computers to education and training. One is the use of computers to administer and score standardized examinations and tests. Pre-coded answer sheets, optical mark readers and multiple choice exams became the norm in university undergraduate programs and high schools. Recent advances in database applications and internet software have extended this function to include question generators and online examinations. A second application that grew out of standardized testing was the use of computers to capture student achievement and course completion. Computer managed instruction (CMI) allowed universities and corporations to track student and employee progress through courses and programs, identify deficiencies and generate reports. Today, most computer based training programs have an embedded CMI system included and universities are using web technologies to offer more CMI abilities to students. Databases also allowed for the development of the third application of computers to training and education – the establishment of guidance or career selection programs. Through the use of diagnostic questions and indicators, computers can recommend potential careers or jobs for individuals. This has led to the

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process (CBT/WBT).

establishment of online job banks and improvements in the field of job analysis. However, it is the last two applications of computers noted by Kearsley that have had the most profound effects. The development of computer assisted instruction (CAI) and simulators have provided the greatest gains for the use of technology in training. CAI allowed teachers to offer instruction in repetitive skills (such as multiplication tables) or remedial instruction to students without detracting from the learning experiences of other students. Today, CAI programs offer instruction in typing, math, reading, and various other skill intensive tasks. In the same vein, simulators offered trainers the ability to teach trainees skills and tasks that were often dangerous or too costly to be performed on the actual equipment (e.g., Flight Training). By replicating the work environment, a simulator can offer trainees the ability to practice essential skills in many of the situations they will encounter on the job. Advances in training transfer and computer technology have allowed simulation to become one of the most widespread applications throughout the military, business and industry (Garavaglia, 1996; Holmes & Garrity, 1998).

In recent years, the application of computers in the fields of training and education has undergone extensive revision – thanks in part to two developments:

1. reduction in equipment costs; and
2. improvements in computer interfaces (Kearsley, 1985).

Originally, computers were large complex machines requiring complete buildings to house them and an army of technicians to keep them running. Computing time was expensive and limited mainly to scientific and mathematical endeavors. The invention of the transistor offered some reduction in size, but computers were still expensive and highly technical. Computer interaction with these large mainframes was limited to statistical tabulations, mathematical calculations and data collection. Computer use required an understanding of programming languages such as COBOL or FORTRAN and output was limited to text, symbols and equations. However, the critical factor in the spread of computer technology can be linked to the invention of the microcomputer. Ashby (1967) equates this development with the beginning of the revolution in training and education. The microcomputer offered increased portability, increased availability and increased ease of use. As Rogers (1995) notes the widespread application of an innovation leads to increased adoption and lower costs. For the microcomputer this meant further size reductions and increased computing power, increased applications (software programs) and advances in interfaces. In 1984, the appearance of the Apple Macintosh and its revolutionary Graphical User Interface (GUI) made computers even more appealing and increased ease of use again (Gates, 1995). Other developments such as the mouse, joystick, light pen, touch screens and voice recognition have brought microcomputers to the widespread use seen today. In conjunction with these developments have been increases in the use of computers on the job and in the home. All of these factors have combined to increase demands for the use of computers in education and training.

O'Neil, Anderson and Freeman (1986) identify the following advantages of CBT:[4]

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[4] The literature on computer applications in training reveals the presence of several different terms. Computer Assisted Instruction (CAI), Computer Based Training (CBT), Computer Based Instruction (CBI), Interactive Multimedia Instruction (IMI) and Multimedia (MM) are just some of the terms found. CAI is the earliest of the applications and has been defined as the use of a computer during the instructional process. It use is limited to drill and practice, tutorials, instructional games, simple models, rudimentary simulations and rule based problem solving (Legassie, 1994). In contrast, CBT, CBI, IMI, and MM are used to describe complex instruction that is either stand alone or delivered over a corporate network or the internet. Instruction can occur independent of classroom activities. Learners are able to complete a series of lessons or units at their own pace. Since CBT offers the most innovative applications for training, this

- reduced training time,
- reduced need for expensive equipment,
- reduced need for instructors,
- decrease in the time required to update instructional materials,
- consistent and high quality instruction,
- individualized and self-paced instruction,
- 24 hour use capabilities, and
- an ability to increase training ability by adding more machines.

While many of these are found in other studies of CBT effectiveness, there are some caveats to the list that are worth noting. First, supporters of CBT often point to its abilities to ensure consistent instruction and reductions in training time as the most important benefits. While substantial reductions in training time have been reported, the exact amount tends to vary. Bahils (1995), Trevor-Deutsch (1995) and Kearsley (1985) all report reductions of 30% for CBT training. However, Hall (1997) estimates that WBT can reduce training time by as much as 50%. In Canada, the Office of Learning Technologies (OLT) (1998) suggests that these discrepancies can be attributed to the subject matter – "hard" content offers the greatest reduction while "soft" content is much more limited in its returns.[5] Second, although consistency of instruction is a legitimate claim the statement tends to downplay the considerable effort needed to produce good

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review will concentrate on the results of CBT evaluations. To avoid confusion, the term CBT will be used to refer to training in this category.

[5] Hard content refers to material that is mostly factual in nature and unambiguous. Examples would be mathematics, science, procedures, or skill development. In contrast, soft content usually has a more heuristic approach and requires interpretation or analysis of the information presented. This is usually associated with higher order cognitive skills (i.e. analysis and synthesis) or affective domain training.

quality CBT. Stemler (1997) suggests that often, CBT appears as a collection of buttons or links on a screen with very little regard to learning theory or principles of instructional design. To be effective, developers must pay attention to screen design, feedback requirements, assessment procedures, remediation loops and student activities. Furthermore, the varying Levels of Interactivity (Schwier & Misanchuk, 1983; Welsh, 1998) available to CBT developers requires considerable instructional design expertise to ensure it meets the training objectives. Therefore, while reductions in training time and consistency of delivery are considerable advantages of CBT, the high costs and long production cycles associated with CBT development often offset these. The absence of experienced designers, programmers and graphic artists can seriously limit the effectiveness of a computer based training package. Finally advances in CD-ROM technology, computer memory and the development of the Internet are leading the discussion of the "anytime, anywhere" campaign for CBT instruction. Certainly, access to computers is increasing. Recent estimates suggest that one-quarter of households in Canada own a computer (OLT, 1998), but this figure does not reflect the capabilities of the systems (e.g., Pentium Class vs. older 486 models). Furthermore, the standard access point to the Internet is via a telephone line and modem with the average access speed of about 28,800 bits per second (28.8 BPS). These two factors limit the amount of "high–end" features that can be programmed into CBT products. As a result, much of the CBT produced for in-house training cannot be delivered via CD-ROM or Internet connections because of bandwidth and memory concerns. Therefore, the portability of high end products is limited. However, these concerns are not strong enough to warrant a rejection of the technology (as was the case with radio and television) for use in training. Instead, advances in compression techniques, lower computer prices and increases in bandwidth offered by new technologies (such as fiber-optic and cable modems) will eliminate many of the caveats. Increasingly, CBT will become "better, faster and cheaper" than traditional instruction for some fields (Fierheller, 1996). Despite these benefits, the claims of both Cuban (1986) and Johnston (1987) are still applicable. Proper implementation and training are essential to ensure the effectiveness of Category 3 technologies. In the CF, little is known about these considerations.

Category 4 – Simulators & Trainers. In the military, a significant portion of occupation training is highly procedural, repetitive, and quite often too hazardous to complete on the actual equipment. Furthermore, "the real thing" can be expensive to operate and maintain. Often training is not factored into the operational plan of the equipment. Therefore these additional demands can erode the operational effectiveness of units tasked to conduct training and shorten the lifecycle of valuable military equipment. As a result, simulations and simulators have become a vital part of military training. Beginning with the use of the Link Flight Trainer to assist in pilot training during World War II through to today's modern applications of aircraft and marine simulators, computerized and mechanical training devices are vital to the success of military training (Heintzman, 1984). To be fair, there is a considerable difference between a simulation and a simulator. A simulator *is a machine that attempts to reproduce or represent the exact or nearly exact phenomena likely to occur in the real world* (Andrews, 1988, p.48). Conversely, a simulation is a *representation of the features and behaviours of one system through the use of another* (Thiagarajan, 1998, p.35). The definition implies that a simulation does not require any advanced technology to operate. This is the key difference between a *simulation* and a *simulator*. Often, simulations are ruled out during media selection because course designers fear they have a high cost and require specialized facilities. In actual fact, they are discussing a simulator. Simulations can be mechanical, electrical, computerized and abstract. For example, Senge (1990) uses a simulation of a beer manufacturer, supplier and retailer to illustrate the concept of systems thinking. The simulation runs simply by having a facilitator go from room to room and deliver messages to each of the three teams involved. It can be run anywhere and requires no equipment, yet is an effective representation of reality.

In any simulation, four basic events are involved: (1) a trainee is presented with a scenario/event, (2) the event facilitates a reaction from the trainee, (3) the trainee reacts, and (4) the scenario/event reacts to the trainee input. This cycle may be repeated at various frequencies and often overlaps with other cycles during a computerized simulation – thus allowing for increased efficiency in training (Alessi & Trollip, 1991). This approach is used to replicate all aspects of flying a fighter jet, navigating a warship or operating a tank.

Reynolds and Anderson (1992) suggest that the most effective training applications combine the use of simulations and simulators:

> Training on a learning station before the simulator session enables the simulator to put the trainee's knowledge to the test in a realistic way. The more costly special simulator then does not simply teach or provide experience. It tests the learner's real knowledge of the equipment. (p.204)

To this end, there are several additional factors that must be considered when selecting a simulation or a simulator for use in training. One of the most important is determining the level of fidelity required. As Thompson (1989) reports, fidelity is *the degree of similarity between* [the] *training situation and the operational situation* (p.214). It can be divided into two types – physical fidelity and functional fidelity. Physical fidelity refers to the correspondence between the simulated environment and the actual environment (is it a true representation of the real thing?). Conversely, functional fidelity is a measure of the ability of the hardware or software to emulate conditions representative of the actual experience. For example, when a pilot completes a dive in cockpit simulator, it should react the same way as the actual plane. If there is lag time between action and response, functional fidelity is at fault. As Alessi & Trollip (1991) note fidelity (both physical and functional) are important considerations in the selection of any simulation device:

> Historically people believed that increasing fidelity in an instructional setting led to better transfer. However, research has demonstrated that the relationship between the two is more complex than this and depends on the instructional level of the student

As they outline, the high fidelity simulator can actually detract from the training value (p.135-137). Therefore, careful consideration of the learner and the expected outcomes is vital to achieving maximum benefit from simulations and simulators (Andrews, 1988).

Simulations and simulators have gained popularity in recent years for several reasons. First, advances in computer technology have allowed the development of advanced Image Generators (IG) which can depict more realistic representations of environments. Second, the increased computing power has corresponded with dramatic declines in the cost of computers, thus allowing more training and educational activities to be simulated at much lower costs than using actual equipment. Third, the increasing technological complexity of many weapons systems and work environments has resulted in higher needs to ensure the safety and integrity of the system. Therefore, training is often a high-risk activity and alternatives must be sought to ensure future operators have achieved basic competencies before using the actual equipment. Fourth, simulations allow trainees to master specific procedural tasks such as formation flying and navigation more quickly than in the past. Previous instruction of these skills was limited to classroom lectures augmented by static photos or videos. Although trainees often expressed mastery of these procedures verbally, performance of these skills was often difficult to achieve without considerable practice on the actual equipment (Andrews, Edwards, Mattoon & Thurman, 1996). Finally, simulations and simulators allow trainees to play an active role in the learning experience, thus increasing motivation and achievement (Allessi & Trollip, 1991).

Throughout all of the evaluations listed above, three things are evident:

1. the technology must be appropriate for the desired learning outcome;
2. instructors must receive adequate training and support for the technology to be accepted and used;
3. curricula must be re-designed to ensure the technology is integrated into the training instead of serving as an "add-on" or substitute for actual equipment.

Therefore, the research instrument used to collect data for this study includes items requesting information on these areas. Specific details are discussed in the following chapter.

Diffusion Research

In addition to the conclusions generated by evaluations of technology use in training, there is a second branch of research that can offer considerations for this study. For several years scholars have been studying why some technologies achieve widespread adoption (e.g., the Internet) while others are introduced and then decline (e.g., Beta videocassette recorders). This avenue of inquiry is known as Diffusion Research. Specifically, it attempts to identify trends or patterns that can be used to predict how long it will take an innovation to succeed or, conversely, what factors contribute to its failure. Much of this research focuses on the characteristics of the organization or social group where the innovation is introduced because *an important factor affecting the adoption rate of any innovation is its compatibility with the values, beliefs, and past experiences of the social system* (Rogers, 1995, p. 4). In short, the reactions of the population receiving the innovation will determine its level of acceptance. Rogers (1995) offers the most comprehensive discussion of diffusion research. His research indicates that three items affect the success of any innovation:

1. the reactions of individuals in the social system;
2. the reason or need for the innovation; and
3. the structure of the organization.

All of these raise important considerations for the introduction of training technology in the CF. Therefore a brief description of each is required.[6]

Individual Reactions. According to Rogers, members of a society can be grouped into one of 5 categories based on their reactions to new technology:

- Innovators;
- Early Adopters;
- Early Majority;
- Late Majority; and
- Laggards

Innovators are the members of a society who take the lead with innovations. Often they seek out new ideas and use them for their own interest and benefit. Innovators act as

[6] This information is drawn from Rogers (1995) Diffusion of Innovations unless otherwise noted.

gatekeepers of the system and are responsible for introducing new ideas to the social system. Although the innovators may serve as gatekeepers, early adopters are the opinion leaders. This group is the first to adopt an innovation on a large scale within a society and others defer to them for advice and assistance. Rejection of an innovation by early adopters usually results in a failed implementation. Once the early adopters have sanctioned the innovation, the early majority implements it. Individuals in this group see that the innovation will become widespread and seek to maximize their advantage by "getting in on the ground floor". The final two categories – late majority and laggards refer to those individuals who need more convincing. Members of the late majority usually adopt because of economic or social pressures. They remain skeptical of the innovation unless given a reason to adopt. Finally, laggards are the members of the social system who refuse to adopt until it is absolutely necessary. Often they wish to keep the status quo. In any innovation, the laggards will offer the most opposition.

Reasons or Need for the Innovation. Closely related to the alignment of adopter categories is the reason for the innovation. Innovation decisions are of three types:

1. *Optional Innovation Decisions*. The decision to adopt or reject an innovation is totally voluntary across the society or organization. No penalties exist for non-adoption. Media campaigns conducted by city administrations encouraging people to recycle offer an example of optional innovation decisions. Adoption is strictly voluntary and there is no penalty for non-adoption of the innovation.
2. *Collective Innovation Decisions*. Individuals are given the freedom to adopt from a series of choices to meet a desired goal. An example is the reduction of

air pollution in California. Adopters can choose from a series of options such as car pools, public transit, telecommuting, etc, but collectively, the social group must achieve the goal of reducing air pollution.

3. *Authoritative Innovation Decisions*. Individuals have no freedom in the innovation decision. The choice to adopt or reject is made by a central authority and communicated to the adopters. Innovations of this type have the fastest rate of adoption, but are also subject to more complications due to resentment and confusion. They are common in the CF given that policies and procedures are developed at the National Defence Headquarters level, and communicated to the Commanders of the various branches (Army, Navy, and Air Force) for implementation.

Organizational Structure. The final item that affects the adoption or rejection of a new idea is the structure of the organization to which it is introduced. In general, the larger the organization the easier it is to innovate. When a new adoption is introduced, the organization will go through a cycle of identifying problem areas (agenda-setting); finding potential solutions (matching); implementing the item and re-organizing to accommodate it (refining/restructuring); and finally, working with the new process, procedure or tool (clarifying) until it becomes part of the organizational culture (routinizing). This cycle is repeated as new problems are identified and matched with innovations. Within this framework, the adopter categories noted above and the types of innovation decisions operate. For the CF, the importance of this research is paramount. Because many of the innovation decisions associated with training technology are authoritative, any resentment or delays on the part of the instructors or training establishments can result in reduced training efficiency. Therefore, the need to determine if such concerns exist in the training system must be given a high priority.

Another area that offers support to the present study relates to the consequences of innovations. Gayeski (1997, 1989) examined the implementation of various types of training media in an effort to find a process for predicting which new media will be successfully adopted by trainees and educators. She found seven criteria that influence the success of new technologies:

- technophobia (fear of a new technology)
- concerns over inhibition or reductions in the need for human contact
- disruption or displacement of the status quo
- poor instructional design
- unreliability of the technology
- lack of standardization
- the inability to develop new content locally

Therefore, an attempt must be made to measure these items in order to determine the effectiveness of training technology in the CF.

Several other researchers have offered similar thoughts on diffusion of training technologies (Kline & Gardiner, 1997; Wilson, 1999), but all echo the themes raised by Rogers (1995) and Gayeski (1997). To be successful, all members or the organization must adopt training technology, routines and processes must be changed to accommodate the technologies, and orderly implementation plans must be communicated to all members of the organization.

Trainees' Reactions

One last area remains in the discussion of media use in training – the response of trainees to the types of technology used in training. Gagne (1985) states that any learning situation is composed of two important conditions – those internal to the learner and external conditions offered by the learning experience. Specifically, external conditions are presented to the learner for the purpose of changing behaviors or attitudes. Technology is often a vital component of external learning conditions. However, equally as important for Gagne are the internal conditions – the ideas, concepts, opinions and perceptions that the trainee brings to the learning experience. If these do not match or synchronize with the external conditions, learning will be impeded. Salomon (1985) elaborates on this concept:

> Whereas computers entail many, and often unique and individually tailored, learning opportunities, their realization greatly depends on learners' choice as to how they handle them mindfully.

Mindfulness, says Salomon is the combination of the learners' *perceptual, emotional and personological factors, such as one's initial emotional reaction to the material* (p.213). Therefore, when discussing the effectiveness of technologies in training, how trainees react to the technology may be as important (or perhaps more important) than the ability of the technology to replicate specific functions or procedures. Both Salomon (1984) and Beentjes (1989) offer examples of this concept. In both studies, students were exposed to two lessons – one of which used books as the primary delivery medium and the other used television. Following the lesson, students were tested for comprehension of the material and asked to report the amount of invested mental effort (AIME), or how much attention they paid to the material. In both cases, learners reported television as less demanding than books, yet their comprehension of the material was lower than that of learners exposed to the print. Saye (1997) discovered similar ideas in his study of teacher and student reactions to technology in a high school. Through the use of observation and indepth interviews with both students and teachers, his research concluded that students are generally accepting of technology in the classroom, although the attitude of the teacher can weaken this reaction. This point also has important implications for the use of technology in CF training. If instructors can influence trainee reactions to technology, then there is a need to determine how CF instructors react to the new innovations. Furthermore, since trainees can eventually become instructors in the CF model, this factor will yield an indicator of future training effectiveness. Finally, Clark and Salomon (1986) drew the conclusion that passive versus active participation in the learning process affects AIME. Therefore simulation and simulators, which demand active participation from the trainee, should increase AIME and thus improve learning.

Implications for the Research Instrument

It was possible to identify some common themes that should inform the research instrument if the desired data were to be obtained. First, there had to be an attempt to identify if instructors (or the organizations) are following the diffusion models suggested by Rogers (1995). Specifically, questions must obtain data about use and level of fluency with technology and comfort levels with technology used in the Training Establishment. Second, in line with the concerns raised by Cuban (1986) and Johnston (1987) the questionnaire had to solicit information about implementation or support issues for the technology. Finally, in line with the work of Salomon (1983,1984, 1985) trainees and instructors needed to be asked which technologies they believe were most useful to their training. Furthermore, trainees should be asked if the attitudes of their instructors affects how they view the value of the technology used in training. All of this information can then be used to draw some conclusions about the perceptions of training technology use in the Canadian Navy.

Summary

The use of media in education and training has been the subject of much research over the years. In the early days, film, radio and television showed initial promise, but the high costs of production, inflexible broadcast schedules and lack of interactivity limited the effectiveness of these media as tools of instruction. VCRs, tape recordings and records offered some relief from this concern, but use was still limited. The development of the microcomputer gave rise to another series of innovations in education and training. The ability of the computer to replicate graphics and sound and allow interaction with the learner has been a key factor in its adoption as a medium of instruction. Furthermore, rapid advances in computer technology have allowed complex simulations and simulators to become viable alternatives to training on actual equipment. Trainees are able to achieve competence without the costly and often high-risk exposure to expensive and scarce actual equipment. However, throughout all applications of media, care must be taken to ensure that the technology coincides with learner's beliefs and attitudes about the media. Research indicates that some media can invoke higher levels of concentration and effort from learners. This process has been described as the Amount of Invested Mental Effort (AIME). All of these items were examined in assessing reactions of trainees to the use of technology in training.

CHAPTER 3

METHODOLOGY

Krathwohl (1998) identifies two approaches to social science research:

1. start with a hypothesis and attempt to validate it; or
2. gather data about interesting situations and let explanations emerge.

The first option is usually equated with quantitative inquiry and the latter with qualitative inquiry. However, he warns that this is an oversimplification of the research process. Often, research problems cannot be categorized into either of the categories – they fall somewhere in between. Such is the case here. The research began as a series of observations formed while the investigator was working as a Training Development Officer in one of the organizations under study that the introduction of new technology into naval training yields diverse reactions from trainees and instructors. In general, most students appeared to appreciate the new tools but expressed concerns about how their use was being implemented, while some instructors felt technology detracted from the instructional process. However, there was no empirical evidence to support this observation. Instead, as Clark (1983), surmised many of the concerns were attributed to the organizational and curriculum changes that accompanied the technological advances. Therefore, the present study set out to gain more concrete indicators of trainee and instructor reactions to the technology used in Naval training.

The Research Setting

The Canadian Navy conducts technical and leadership training at five institutions throughout the country. Two are located in Halifax, Nova Scotia, one in Quebec City, Quebec, and two in Victoria, British Columbia. Students attend these institutions as required by job tasks and career progression. Since all five schools offer different courses and certifications, students very rarely attend all five. Instead, class of ship training is divided between the east and West Coasts with Quebec City handling much of the training for the Naval Reserve.[1] Furthermore, Officer and Non Commissioned Member (NCM) training is divided into separate divisions within each school. However, all five schools employ a considerable amount of training technology—particularly Category 3 and 4—during instruction (see pages 6-9 for a description of these categories).

In the Navy, Officer and NCM occupational training are separated due to the diverse nature of the jobs. Most of the technical, maintenance and staffing functions of shipboard life are contained in the NCM curriculum. Officer training is more focused on three key areas:

1. Navigation training
2. Shiphandling skills and
3. Preparation for command

Each of these areas requires considerable classroom instruction and individual study accompanied by practical training aboard ship. Navigation training focuses upon

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[1] In the Canadian Navy, there are three types of ships. Tribal Class Destroyers are the largest. Operational roles are divided between Command and Control and protection of the Task Force. In contrast, the Canadian Patrol Frigate (CPF) is a multi-purpose warship designed to operate in any situation. Finally, the Maritime Coastal Defence Vessel (MCDV) is assigned the role of protecting Canada's coastline and ensuring the sovereignty of inland and coastal waterways. Each ship class has different armaments and equipment to fulfill its mandate. Therefore, the training curriculum has been divided across class of ship requirements. The two schools in Halifax offer CPF training. Tribal Class training is offered by CFFSE and MCDV training is concentrated in Quebec City. Since the principles of ship navigation and ship handling are the same for any ship, this training is concentrated at NOTC.

teaching new trainees the ability to navigate ships at sea via electronic fixing aids (EFAs) such as Global Positioning Systems (GPS), planning transits and maintaining tracks and ensuring safe passage of the ship through areas such as reefs, canals and harbors. Shiphandling, or Officer of the Watch (OOW) skills, are focussed upon ensuring trainees are able to safely and accurately maneuver the ship in all weather conditions and during both operational and non-operational tasks. It involves instruction in Nautical Rules of the Road, Ship Stability, Conning Orders, and Battle Tactics. Preparation for command is present throughout all phases of navigation and OOW training. Both during navigation passages and OOW maneuvers, trainees serve as the Captain's representative and have the authority to give orders and commands to ensure the ship remains safe and battle ready. Furthermore, when the Captain is off the bridge, the OOW is in command of the ship actions.

In the past, Navigation and OOW instruction were conducted via a series of classroom lectures and tests (Ashore Phase) followed by a period of practical training in Minor War Vessels (MWVs) and Destroyers (DDF). However, increasing costs, new equipment purchases and budget cuts required a shift in the way training was conducted throughout the Navy. Furthermore, the increasing technological complexity of equipment meant standard training approaches (e.g., lecture) were no longer effective methods for training new personnel (both Officer and NCM). Therefore, new technology such as CBT and simulation was incorporated into the training cycle to reduce training costs and increase efficiency. All of these changes revolutionized the way training is conducted in the Canadian Navy and has led to substantial changes in trainee and instructor tasks.

Like Officer Training, Naval NCM Training has also undergone extensive revisions in the last few years. Before the acquisition of the CPF and MCDV in the 1990's, much of the NCM Training was centered on traditional classroom instruction (with Category 1 training aids) followed by practice on mock-ups of the actual equipment or a period of apprenticeship/afloat training onboard a ship. However, as the CPF and the upgraded Tribal Class Destroyers began to enter the Fleet, the existing equipment and training aids became obsolete. For the schools to continue training wholesale changes were required. Existing training programs were amended to reflect new job descriptions and more technology was incorporated into the training to ensure trainee competence before arrival onboard ship. Today, NCM training makes extensive use of CBT and PTTs. All of these changes have resulted in different roles for students and instructors. Also because Naval Training Establishments draw their instructional staff from the Fleet, trainee reactions to the technology employed in training today can have considerable impact on the nature of training in the future.

Description of the Study Population

The study population was limited to students and instructors engaged in training at VENTURE, The Naval Officer Training Centre (NOTC) and Canadian Forces Fleet School Esquimalt (CFFSE) in Victoria, BC. NOTC is home to all introductory Officer Training in the Canadian Navy. The curriculum includes courses in basic seamanship, shiphandling, navigation and collision avoidance. The recent acquisition of a large-scale simulator and development of web and computer based training (WBT, CBT) have resulted in a significant redesign of training delivery.

Students are now exposed to all three levels of training technology during their tenure in the school. CFFSE is home to all Non Commissioned Member Training for the Tribal Class Destroyers. A significant portion of this training is delivered via interactive multimedia and presentation technology and simulation has recently been added to the course curricula. Since the establishments deal with different target populations, measuring the reactions of trainees and instructors to these innovations was necessary to gather data about the perceptions of technology use in Officer and NCM training.

NOTC was selected for the study because all Watchkeepers in the Navy must attend the school to achieve a basic competence in Shiphandling and Navigation. Furthermore, these students enter the fleet, obtain experience and could ultimately return to VENTURE as an instructor. Therefore, their perceptions of the technology used in training can have important implications for future training. CFFSE was selected because of the two schools that conduct NCM Training, CFFSE employs a greater level of Category 3 and 4 technology. As with NOTC, students may return to the school as instructors after further training and experience, thus once again making perceptions of technology use important indicators of future success. Finally, the investigator was familiar with the operations of both schools, having previously worked as the Training Development Officer at NOTC and therefore was able to arrange access to trainees and instructors more easily than at the other schools. However, most of the training in the other training establishments follows a similar pattern to NOTC and CFFSE and since many of the trainees and instructors have served in the same ships or positions, results from these two schools should be indicative of the Navy in general.

Methodology

To obtain the required information about trainee reactions to technology, several approaches could have been used. A qualitative approach would have required interviews with staff and students at the two institutions with sessions being recorded and transcribed for later analysis. A second option would have been to observe several classes at NOTC and CFFSE over a period of time (2-3 months) and note the reactions of instructors and trainees. Both these approaches were initially considered. However, as a condition of permission to complete the study, the Navy stipulated that the research could not impede or delay training. Since training at both NOTC and CFFSE is strictly regulated, any data had to be gathered with minimum interruption to normal training activities. This condition made lengthy interviews unacceptable. Second, the time frame of the study was limited due to conditions placed on the investigator by the Canadian Forces; thus an extended observation of two or more courses was not an option. As a result, any qualitative approach to data collection was rejected. In order to meet the criterion of non-interference with training and to adhere to the time limitations imposed upon the investigator, a decision was made to employ survey research.

As most research texts note, surveys can be conducted in many different ways (Krathwohl, 1998; Kerlinger, 1973). To be precise, the following methods of data collection are available:

1. individual interviews
2. group interviews/ focus groups

3. telephone surveys
4. email surveys
5. traditional mail questionnaires

Each of these options was given consideration against the two criteria noted above (non-interference & brevity). Individual and group interviews or focus groups were rejected for the same reasons as qualitative research. If conducted after hours, telephone surveys might provide a feasible alternative. However, the lack of a dedicated research staff, and the large number of transient trainees in the study population made this alternative undesirable. Although relatively new, email questionnaires are gaining in popularity among survey researchers. Recent research has shown that if specific procedures are followed, return rates can be equal to or higher than traditional mailout surveys (Schaefer & Dillman, 1998). This option was rejected because a large portion of the study population was unlikely to have access to the internal DND email network and the transitory nature of the training progression also limits the access to Internet email. A final option considered was traditional mail surveys. This process requires questionnaires to be printed and mailed to potential respondents with a letter of transmittal and instructions for return. Since all of the trainees and instructors have access to the CF Postal System, this was initially considered as the study methodology. However, after discussions with the Liaison Officers in NOTC and CFFSE, it was determined that the best way to ensure high completion rates and cause the least amount of inconvenience was through a concentrated application of the research instrument during course time.

The Research Instrument

Oppenhiem (1966) states that the development of a research questionnaire involves five steps:

1. determining the method of data collection;
2. developing a strategy for selecting respondents;
3. deciding upon an approach for the questions (closed versus open ended);
4. sequencing and wording the questionnaire to obtain the required data;
5. field testing and revising the instrument to ensure validity and reliability.

Items one and two refer to the way respondents are selected and administered the questionnaire. Details concerning the decision processes in these areas for this study are noted below. What remains to be discussed is the development and testing of the questionnaire. Using the studies discussed in Chapter 2 as a guide, items of importance were categorized into three areas - technological literacy, acceptance of technology and general reaction to its use in training. Then specific questions were developed to obtain the data necessary to answer the research question. To limit the amount of time required to complete the questionnaire, all questions were originally closed ended. However, because some issues, such as opinions of technology implementation and suggestions for future use, are difficult to categorize, the final version included a few open-ended questions as well. Initially, it was thought both trainees and instructors could be given the same questionnaire. Therefore, a prototype questionnaire was emailed to other CF Training Development Officers for review and comment. The feedback from this review indicated that several areas of the questionnaire appeared confusing and that two separate questionnaires would be a better option. With this feedback, a trainee version and an instructor version were prepared and administered to military personnel in Calgary for testing. Reactions and comments from this group resulted in the final versions of the questionnaire (Appendices 1 & 2).

The first questionnaire was for distribution to students in NOTC and CFFSE. It contained 46 items and was divided into three parts. To ensure high completion rates and limit the time required, many of the questions were closed ended requiring the respondent to select from a series of choices. In some instances, respondents were asked to explain their choices or offered open-ended questions requiring a specific opinion or comment. The second questionnaire was for distribution to instructors at NOTC and CFFSE. It contained 47 items and questions were similar in nature to those of the trainee version.

In the final form, both questionnaires consisted of three parts. Part One requested information about respondents' familiarity with technology and included such things as questions about computer ownership, computer use, access to the internet, technology owned or planned to be purchased and respondents' general impressions of how the technology contributed to the quality of their training. Part Two was more focused on respondents' impressions of technology use in the classroom. Specific questions dealt with the type of devices used and the frequency of use in addition to questions about reactions to the devices and their effects upon desire to learn and motivation. Trainees were asked to rate how often it was used and how they reacted to it. Instructors were asked to rate how often they (or their peers) used technology in instruction and whether they felt it generally increased or decreased instructional effectiveness. Questions also focused on whether or not instructors received training on the new devices before implementation into the classroom. Part Three gathered information on demographic variables such as age, gender, rank, language and educational backgrounds for both instructional staff and trainees.

Data Collection

Before data collection could begin, permission to conduct the study was obtained from the Director of Navy Personnel Production (DNPP) and the Commanding Officers (CO) of CFFSE and NOTC. Permission was granted in August of 1998 and preparations for data collection began. At the same time as DND permission was being considered approval from the University of Calgary Ethics Committee was sought. Approval from the Ethics committee was obtained in early September. Following this, a liaison officer was contacted at both CFFSE and NOTC and briefed on the requirements of the study. Each contact provided the investigator with the number of trainees and instructor in house who were designated to participate in the study. Data Collection was organized for a five-day period in September 1998 and questionnaires were emailed to the Chief Standards Officer at NOTC for duplication and distribution in accordance with the study guidelines. A consent form and letter of transmittal (Appendices 3 and 4) accompanied each questionnaire. Completed questionnaires were collected during a visit by the investigator to both facilities the following week. This helped to ensure maximum participation by the in-house personnel at the time of the survey.

Data Tabulation

All close-ended questions were coded in advance of distribution to increase the accuracy and expedite the tabulation process. Once received, responses could then be entered into the computer using the assigned number corresponding to the selected answer. Open ended question responses were transcribed for later analysis. Using SPSS 8.0, data were tabulated and analyzed in two ways. First frequencies for each response were calculated. Results were reviewed and checked for errors or inconsistencies. These data were then used to select items for closer examination.. After data were deemed acceptable, they were simplified into tables and graphs for use in the final report.

Summary

Through the development and administration of questionnaires to trainees and instructors at two Naval Training Establishment in Victoria, BC, the research project examined reactions to the use of technology in training. Two out of five schools were chosen because of ease of access and high levels of Category 3 and 4 technology use. Questionnaires were emailed to a liaison officer on site for copying and distribution and then retrieved by the researcher during an on site visit two weeks later. Closed-ended responses were pre-assigned date entry codes to decrease analysis time and reduce errors. Open-ended responses were transcribed for later analysis. Data were then tabulated and prepared for inclusion in the research report.

CHAPTER 4

RESULTS AND FINDINGS

Introduction

This chapter presents the results of the investigation. Responses to the forced-choice questions were analyzed using Statistical Package for the Social Sciences (SPSS) v.8.0. No statistically significant results were found from comparisons among means, nor did cross-tabulations examining potential relationships between variables yield any statistically significant results. Therefore, in the pages that follow, responses to these questions are reported and comments offered on potential points of interest. Furthermore, responses to the open-ended questions were clustered and tagged as to location of training and gender to see if any commonalties emerged.

Description of the Study Population[1]

The population for this study consisted of trainees and instructors at two Naval Training Establishments in Victoria, BC. As Tables 1 and 2 indicate, 68 trainees and 12 instructors completed the questionnaire. In total, 43 were trainees at NOTC and 21 were at CFFSE. NOTC provided 5 instructors with 7 from CFFSE. Of the trainees who responded 52 (76.5%) were male and 15 (22.1%) were females. Eleven of the instructors were males with one female among the respondents.

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[1] In the tables that follow, percentages have been rounded to one decimal place and, as a result, some rows and columns may not appear to total exactly 100%. Unless otherwise noted, data are expressed as percentages of row.

Table 1 – Respondents by Gender

Respondents	Male	Female	Row Total
Trainees	52 (76.5%)	15 (22.1%)	68 (100%)
Instructors	11 (91.7)	1 (8.3)	12 (100)
Column Total	63 (78.7)	16 (20)	80 (100)

Table 2 – Respondents by Training Establishment

Institution	Trainees	Instructors	Row Total
NOTC	43 (89.6%)	5 (10.4 %)	48 (100%)
CFFSE	21 (75)	7 (25)	28 (100)
No Response	4	--	4 (100)
Column Total	68 (78.5)	12 (20)	80 (100)

Tables 3 and 4 break the respondents according to military rank. As indicated there is an equitable distribution between NCM and Officers ranks. Officers are designated by the ranks of Officer Cadet, Second Lieutenant, Lieutenant and Captain. The remainder are NCM rank structures with Private being the junior rank and Warrant Officer the senior NCM rank in the study population.

Table 3 – Trainees by Rank and Gender

Rank	Male	Female	Row Total
Private	13 (72.2%)	5 (27.8%)	18 (100%)
Corporal	2 (66.7)	1 (33.3)	3 (100)
Master Corporal	2 (100)	--	2 (100)
Officer Cadet	6 (85.7)	1 (14.3)	7 (100)
Second Lieutenant	21 (75)	7 (25)	28 (100)

Rank	Male	Female	Row Total
Lieutenant	6 (85.7)	1 (14.3)	7 (100)
Captain	2 (100)	--	2 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

Table 4 – Instructors by Rank and Gender

Rank	Male	Female	Row Totals
Private	1 (100%)	--	1 (100%)
Corporal	1 (100)	--	1 (100)
Master Corporal	2 (100)	--	2 (100)
Sergeant	1 (100)	--	1 (100)
Warrant Officer	1 (100)	--	1 (100)
Captain	4 (80)	1 (20)	5 (100)
No Rank Listed	1 (100)	--	1 (100)
Column Total	11 (91.7)	1 (8.3)	12 (100)

As shown in Table 5, course breakdowns were also well balanced. NOTC trainees were divided between MARS III (Regular and Reserve Force) where they are required to develop basic competencies in Officer of the Watch Manoeuvers (OOW) and Navigation and MARS IV which requires them to apply these principles on a consistent basis. Both courses make extensive use of simulation and presentation technologies to deliver instruction. At CFFSE, the majority of trainees were enrolled in an OS QAB Course (this is a basic job qualification for an Ordinary Seaman) while the remainder were completing Naval Weapons Technician Level 6A (NWT QL6A) training or a Naval Electronic System Operator (NES OP) advanced training course.

Both of these courses teach advanced maintenance and operational procedures for weapons and communications systems onboard Tribal Class Destroyers. The instructional strategies rely heavily on a self-paced Computer Based Training system that replicates shipboard routines and process. Four of the respondents did not indicate which course they were attending. Instructors were asked to identify which course they were currently instructing. Four reported instructing MARS Training (MARS III, MARS IV and DNO), with the remainder instructing CFFSE courses.

Table 5 – Course Breakdowns by Establishment

Course	NOTC	CFFSE
MARS III	18 (26.5%)	--
MARS III (R)	15 (22.1)	--
MARS IV (R)	8 (11.8)	--
FNO Course	2 (2.9)	--
NWT QL6A	--	1 (4.7)
OSQ AB	--	18 (85.7)
276 NES OP	--	2 (9.5)
No Response	--	--
Column Totals	43 (63.2)	21 (30.9)

Technological Literacy

Part I of both questionnaires asked respondents to provide information about computer ownership, level of familiarity with technology intended technology purchases and Internet use. This information was designed to develop and indication of the technological literacy of the respondents in an attempt to identify their standing in Rogers (1995) Adoption Model. For trainees, computer ownership is almost evenly divided. 55.9% (38) reported that they owned a computer while 44.1% (33) said they did not. However, a further 42.6% (29) indicated they intended to upgrade or purchase a new computer. For instructors the results were similar. Two thirds of the respondents reported owning a computer. Three more indicated they would purchase or upgrade a computer in the near future. Furthermore, a clear majority of both trainees and instructors (66.2% for trainees) stated they have been using a computer for longer than five years. When asked to specify which activities comprised most computer use, trainees listed Word Processing as the main task (26%) although email, surfing the Internet and computer games are popular activities as well (10.3% each). For instructors, the results reflect many of the same patterns. Two thirds of the respondents list word processing as the major use. The remainder is divided across email, and surfing the Internet. Table 6 shows that both instructors and trainees rate their level of confidence with computers and technology as medium to high.

Table 6 – Levels of Confidence with Technology

	High	Medium	Low	Row Total
Trainees	27 (39.7%)	30 (44.1%)	11 (16.2%)	68 (100)
Instructors	3 (25)	6 (50)	3 (25)	12 (100)
Column Total	30 (37.5)	36 (45)	14 (17.5)	80 (100)

As a final note on technology use, respondents were asked if they had access to the Internet at home. For trainees, 44.1% reported that they could access the web from home compared to 55.9% who could not. Conversely, most of the instructors surveyed said they did not have Internet access at home. Only four reported they could search the web from home.

Reactions to Technology Use

Several questions in Section One of the questionnaire asked respondents to state their general impressions of the technology used in CF training. The results of these questions are presented in the tables 7, 8 and 9.

Table 7 – General Impression of Technology Used in Training

	Very Positive	Positive	Acceptable	Little Value	Total
Trainees	17 (25%)	28 (41.1%)	20 (29.4%)	3 (4.4%)	68
Instructors	4 (33.3)	5 (41.7)	3 (25)	--	12
Column Total	21 (26.3)	33 (41.3)	23 (28.7)	3 (3.7)	80

Table 8 – Item Most Beneficial in Training (Trainees Only)

Item	Males	Females	Row Total
Simulator Training	23 (79.3%)	6 (20.7%)	29 (100%)
Learning From Experience	8 (72.7)	3 (27.2)	11 (100)
Textbooks	7 (87.5)	1 (12.5)	8 (100)
Multimedia Programs	5 (62.5)	3 (37.5)	8 (100)
Lectures	6 (75)	2 (25)	8 (100)
Peer Tutoring	1 (100)	---	1 (100)
No Response	--	--	2 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

Table 9 – Item Least Beneficial in Training (Trainees Only)

Item	Males	Females	Row Total
Textbooks	20 (71.4%)	8 (28.6%)	28 (100%)
Lectures	13 (86.7)	2 (13.3)	15 (100)
Multimedia Programs	10 (76.9)	3 (23.1)	13 (100)
Simulator Training	3 (100)	---	3 (100)
PowerPoint Lectures	1 (50)	1 (50)	2 (100)
Other Items	1 (100)	--	1 (100)
No response	4 (80)	1 (20)	5
Column Total	52 (76.5)	15 (22.1)	68

Building on these results, Section Two also asked trainees and instructors to answer a series of questions regarding the level of appeal of various training technologies, amount of exposure to them and level of use each receives. Also requested were general impressions and comments on technology implementation. Responses were a mixture of closed and open-ended responses.

Tables 10-12 present the trainee responses to these questions. Generally, simulators and multimedia received the highest ratings and were the most desired of all the technologies. However, a majority of trainees indicated a preference for more training on the actual equipment and noted that the use of videotapes and films during classroom instruction would be beneficial. Classroom Lectures and 35mm slide shows received the lowest ratings. Field trips and guest lecturers also received strong support from trainees as alternatives to classroom lectures.

Table 10 – Level of Appeal for Training Technologies (Trainees Only)

Item	Level of Appeal				Totals
	None	Some	Moderate	High	
Overhead Projector	21 (30.9%)	29 (42.6%)	15 (22.1%)	2 (2.9%)	67 (100%)
Videotape	3 (4.4)	11 (16.2)	40 (58.8)	13 (19.1)	67 (100)
Films	4 (5.9)	13 (19.1)	30 (44.1)	19 (27.9)	66 (100)
Chalkboard	5 (7.4)	27 (39.7)	23 (33.8)	9 (13.2)	64 (100)
Textbooks	10 (14.7)	22 (32.4)	29 (42.6)	7 (10.3)	68 (100)
Study Packages	8 (11.8)	15 (22.1)	34 (50.0)	10 (14.7)	67 (100)
PowerPoint Slides	11 (16.2)	24 (35.3)	24 (35.3)	9 (13.2)	68 (100)
35mm Slides	21 (30.9)	29 (42.6)	17 (25.0)	1 (1.5)	68 (100)
CBT	2 (2.9)	17 (25.0)	27 (39.7)	22 (32.4)	68 (100)
Simulators	3 (4.4)	7 (10.3)	22 (32.4)	36 (52.9)	68 (100)
Actual Equipment	1 (1.5)	4 (5.9)	6 (8.8)	57 (83.8)	68 (100)
Guest Lecturers	7 (10.3)	13 (19.1)	33 (48.5)	15 (22.1)	68 (100)
Field Trips	4 (5.9)	5 (7.4)	18 (26.5)	41 (60.3)	68 (100)
Lectures	5 (7.4)	25 (36.8)	32 (47.1)	6 (8.8)	68 (100)

Table 11 – Times Per Course Technology is Used (Trainees Only)

Item	Number of Times Used Per Course				Totals
	Daily	2-3 tms/wk	1-2times	Never	
OHP	14 (20.6%)	22 (32.4%)	22 (32.4%)	10 (14.7%)	68 (100)
Videotapes	2 (2.9)	29 (42.6)	35 (51.5)	2 (2.9)	68 (100)
Films	--	19 (27.9)	31 (45.6)	18 (26.5)	68 (100)
Chalkboard	42 (61.8)	13 (19.1)	6 (8.8)	7 (10.3)	68 (100)
Textbooks	38 (55.9)	15 (22.1)	8 (11.8)	7 (10.3)	68 (100)
Study Packages	14 (20.6)	20 (29.4)	19 (27.9)	14 (20.6)	67 (100)
35mm Slides	2 (2.9)	1 (1.5)	11 (16.2)	54 (79.4)	68 (100)
PowerPoint Slides	47 (69.1)	9 (13.2)	6 (8.8)	6 (8.8)	68 (100)
CBT	7 (10.3)	12 (17.6)	29 (42.6)	19 (27.9)	67 (100)
Simulators	22 (32.4)	21 (30.9)	16 (23.5)	9 (13.2)	68 (100)
Actual Equipment	8 (11.8)	15 (22.1)	37 (54.4)	5 (7.4)	65 (100)
Guest Lecturers	1 (1.5)	4 (5.9)	39 (57.4)	22 (32.4)	66 (100)
Field Trips	--	1 (1.5)	49 (72.1)	18 (26.5)	68 (100)
Lectures	58 (85.3)	10 (14.7)	--	--	68 (100)
Live Demos	4 (5.9)	15 (22.1)	32 (47.1)	17 (25.0)	68 (100)

Table 12 – Technology Use in Next Course (Trainees Only)

Item	Desired Use in Next Course			Totals
	Less	More	Not at All	
Overhead Projectors	34 (50.1%)	9 (13.4%)	24 (35.8%)	67 (100%)
Videotape	13 (19.1)	50 (73.5)	4 (5.9)	67 (100)
Film	12 (17.6)	43 (63.2)	10 (14.7)	65 (100)
Chalkboard	29 (42.6)	28 (41.2)	9 (13.2)	66 (100)
Textbooks	24 (35.3)	32 (47.1)	9 (13.2)	65 (100)
Study Packages	14 (20.6)	47 (69.1)	5 (7.4)	66 (100)
35mm Slides	13 (19.1)	16 (23.5)	35 (51.5)	64 (100)
PowerPoint Slides	28 (41.2)	28 (41.2)	10 (14.7)	66 (100)
CBT	12 (17.6)	50 (73.5)	4 (5.9)	66 (100)
Simulator	13 (19.1)	51 (75.0)	2 (2.9)	66 (100)
Actual Equipment	2 (2.9)	64 (94 1)	1 (1.5)	67 (100)
Guest Lecturers	12 (17.6)	46 (67.6)	7 (10.3)	65 (100)
Field Trips	1 (1.5)	62 (91.2)	3 (4.4)	66 (100)
Classroom Lectures	47 (69.1)	14 (20.6)	3 (4.4)	64 (100)
Live Demonstrations	3 (4.4)	61 (89.7)	2 (2.9)	66 (100)

Instructors who responded to the study were of generally the same opinion as trainees. Simulators and multimedia received a high appeal rating and most instructors suggested they would try to use them more often in the next course. Like trainees, instructors also felt that field trips and training on the actual equipment were preferred. However, the small population makes it difficult to draw any valid conclusions about instructor preferences for the use of training technology.

Both trainees and instructors were asked to choose which technology was used most during their current course. A clear majority of trainees (42) reported PowerPoint presentations as the most used with simulators (10) and lectures (9) being the second and third choices. For instructors, there was no clear preference. PowerPoint was favored by four of the twelve, with CBT (2) and textbooks (2) receiving second and third place results. No one technology was rejected outright by trainees or instructors.

In addition to ranking the value of various technologies, trainees and instructors were asked specific questions relating to the implementation of technology in Naval training. Specifically, respondents were asked to identify how much simulation and CBT was used in their training and how they reacted to it. Surprisingly, Tables 13 and 14 indicate that the use of these technologies is less than 50% of the overall course content. Conventional and presentation technologies are used the rest of the time. Most trainees believe more use could be made of simulation and CBT and, as indicated in Tables 15 and 16, would react favorably to an increase in use of these technologies. As further evidence of this positive reaction, 47% of the trainees indicated that they would have a positive reaction to the use of new technology in training with a clear majority (72.1%) indicating that they would like to see higher levels of technology used in existing training.

Table 13 – Percentage of Course Time Devoted to CBT

Duration	Frequency
Less Than 10%	29 (42.6%)
10-25%	12 (17.6)
26-40%	10 (14.7)
41-50%	4 (5.9)
51-60%	3 (4.4)
61-75%	5 (7.4)
Over 75%	1 (1.5)
None	4 (5.9)
Total	68 (100)

Table 14 – Percentage of Course Time Devoted to Simulators

Duration	Frequency
Less Than 10%	12 (17.6)
10-25%	11 (16.2)
26-40%	14 (20.6)
41-50%	9 (13.2)
51-60%	6 (8.8)
61-75%	10 (14.7)
Over 75%	1 (1.5)
None	5 (7.4)
Total	68 (100)

Table 15 – Reaction to Amount of Course Time Devoted to CBT

Reaction	Male	Female	Row Total
Too Much Time	6 (85.7%)	1 (14.3%)	7 (100%)
Right Mix of Class Time & CBT	13 (86.7)	2 (13.3)	15 (100)
Not Enough CBT	28 (70)	12 (30)	40 (100)
CBT Not Used in Course	5 (100)	--	5 (100)
No Response	--	--	1 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

Table 16 – Reaction to Amount of Course Time Devoted to Simulator

Reaction	Male	Female	Row Total
Too Much Time	9 (90%)	1 (10%)	10 (100%)
Right Mix of Class & Sim Time	20 (74.1)	7 (25.3)	27 (100)
Not Enough Simulator Trg	17 (73.9)	6 (26.1)	23 (100)
Simulator not used in Course	6 (85.7)	1 (14.3)	7 (100)
No response	--	--	1 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

Instructor reactions to these questions were similar. Most believed that the current mix of CBT and classroom training was appropriate. Overall, the majority of instructors indicated that less than 10% of course time was devoted to CBT. With regards to simulator training, half of the instructors indicated that it was not used frequently enough in existing courses. According to instructors, less than 25% of course time is currently devoted to simulation. Like trainees, instructors indicated that more technology could be used in training (75%).

Both trainees and instructors were asked if the use of technology during training was a motivational factor. A substantial majority of instructors felt technology increases student motivation with over half indicating that the use of technology in training is advantageous. For trainees, just over 63% indicated that the use of technology in training is a motivator, with most believing it is very beneficial (48.5%) to the training they currently receive. More precise results to these questions can be found in Tables 17 and 18.

A few other results are worth noting before moving on the open-ended questions. The trainee questionnaire asked respondents to state if they felt instructors made effective use of technology in training. The results indicate a positive response – 70.6% of trainees believe instructors do make effective use of technology in training compared to 29.4% who do not. As a method of comparison, instructors were asked if they regard their use of technology as effective. The results were more evenly divided – 58.3% said yes and 41.7% said no. Instructors also indicated that their peers were coping as well as or better than they were. Half of the respondents stated that other instructors used technology effectively with one-third saying they didn't. Related to this issue are the results of question 31, which asked instructors if they were given training on how to use a new technology for training when it was introduced. The majority said they were not. Finally all the instructors who responded indicated they would use the same technology to instruct the course again. Furthermore, a clear majority of trainees (73.5%) indicated they would use the same technologies if they were to teach the course.

Table 17 – Trainee Responses to the use of Technology in Training

Response	Male	Female	Row Total
Increases Motivation	30 (69.7%)	13 (30.2%)	43 (100%)
Increases Anxiety	7 (87.5)	1 (12.5)	8 (100)
Decreases Motivation	2 (100)	--	2 (100)
Decreases Anxiety	1 (100)	--	1 (100)
Has No Effect	12 (92.3)	1 (7.7)	13 (100)
No Response	--	--	1 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

Table 18 – Trainee Views of the use of Technology in Training

Response	Male	Female	Row Total
Very Beneficial	25 (58.1%)	8 (24.2%)	33 (100%)
Some Advantages	23 (76.7)	7 (23.3)	30 (100)
Little Benefit	3 (100)	--	3 (100)
No Response	--	--	1 (100)
Column Total	52 (76.5)	15 (22.1)	68 (100)

General Comments

Throughout the questionnaire, trainees and instructors were given opportunities to expand on questions or provide general comments on the use of technology within their organizations. Responses to these questions were reviewed and categorized into topic areas. Results are shown in Tables 19-22.

Table 19 presents student comments with regard to the increased use of technology in training. In general, responses can be categorized in three ways:

1. The use of technology in training is not a replacement for "sea-time" or hands on training
2. The use of technology is generally positive, but more applications are desired, and
3. An indifference to the use of any technology in training.

Many respondents commented that while the NOTC Bridge Simulator is an effective training aid, they would prefer more access to the at sea experience. Secondly, trainees expressed concern about the quality of the software being used in the instruction. Specifically, poor graphics and low levels of interactivity for CBT appear to be a concern. Several students suggested that more emphasis be placed on adopting quality programs and increasing the interactivity to a more "game-like" environment.

Table 20 illustrates trainee responses to a question that asked for the reasons why technology motivates them to learn. Three themes run through the responses:

1. The use of technology is motivational because it allows for self-paced instruction
2. Course instruction is improved as a result of the technology use, and
3. Technology is not a motivator and sometimes detracts from the learning process.

In particular, trainees reported that the technology is motivational because it reduces anxiety by allowing mastery of key tasks in a relatively stress free environment and allows classroom lectures and discussions to be put in context through demonstrations and replications in the simulator. Also, some reported that the level of interactivity afforded by simulators and CBT allows them to become involved in the learning, thus increasing the desire to learn.

Table 21 details trainee impressions of the way technology is used in their training. Although not all trainees responded to the questions, those that did presented a less than enthusiastic picture of technology use. Many felt that too much emphasis was being placed on the technology as a replacement for "hands-on" training. This was reflected in comments such as the *use of technology is impressive and for the most part effective, but it cannot substitute for the real thing. Scenarios and situations on the technological level have to be carefully controlled and monitored to produce any real benefit* and *sometimes there is an over emphasis on computer simulator training to replace real life hands on that would be important for a ship's officer (navigation)*. Other trainees indicated that the technology is not used to its full potential or does not work as well as expected. Again, three themes emerged from the comments. They are:

1. More use of training technology would be beneficial
2. Poor implementation of the technology tends to distract from the learning experience, and
3. The technology currently in use is used effectively.

The final item on the questionnaire asked trainees if there were any additional comments about the use of technology in training that they wished to express. The results are listed in Table 22. Again, these comments reflected many of the points raised above. Specifically, two categories of comments can be distinguished:

1. A general feeling that technology cannot be used to replace training with actual equipment on the job, and

2. more access to the technology and increased use of it in existing training is required

In particular, many trainees commented that there is a heavy reliance on simulation at the expense of Afloat training. However, there is a general feeling that the simulator improves trainee confidence in advance of afloat training and therefore seems to reduce the anxiety associated with performing the tasks in the actual environment for the first time. Some respondents suggested that technology is occasionally used as a substitute for poor instructor preparation and that instructors should be more adequately trained in how to use the technology. In concert with this, was a suggestion that PowerPoint slide presentations tend to be used too much during classroom lectures. Finally, several trainees recognized that since the equipment used on the job is technology advanced, there is a need to mirror this in the school. Specifically, many trainees suggested that more of the shipboard technology be incorporated into the training curriculum.

Table 19 – Trainee Comments Concerning Technology Used in Training

Trg Est	Gender (M/F)	Comments
		General Suggestions for Improvement
NOTC	M	Multimedia , CBT
NOTC	M	More simulator
NOTC	M	Online info
NOTC	M	Computer charts
NOTC	M	Computer software relating to our training
CFFSE	M	Upgraded Software/Hardware
CFFSE	M	Simulators
CFFSE	M	Simulators and Multimedia
CFFSE	M	Mainly computer based use of simulators
CFFSE	F	More CBT, Simulators
		Simulators, Actual hands on training
CFFSE	M	Anything that emphasizes learning
CFFSE	M	Actual mockups with current equipment in good repair
CFFSE	M	More hands on computer terminals and occupational related equipment
CFFSE	F	Multimedia
CFFSE	F	Simulators, Computer Programs
CFFSE	M	Simulators, CBT

Table 19 – Trainee Comments Concerning Technology Used in Training

Trg Est	Gender (M/F)	Comments
NOTC	M	CBT scenarios for Deck Evolutions, Nav Passages, etc. Set up in a video game format with consequences for mistakes.
NOTC	M	Real multimedia presentations. Some Officer of the Day simulation
NOTC	F	More use of CBT Lab
NOTC	M	Computer Based Training> video game style realistic scenarios
NOTC	M	Internet
NOTC	M	More time in simulator. Maybe some Virtual Reality
NOTC	M	More "virtual" training – sea states (swell, etc)
NOTC	M	Greater Use of multimedia (especially film/video)
NOTC	F	More access to computers – Email is needed
NOTC	M	Virtual Reality simulation, enhanced CBT Technology (i.e. better programs – something better than a DOS 3.1 version)
NOTC	F	The type that brings more realistically the subjects of study (e.g. more real life simulators)
NOTC	F	CBT specifically designed to aid in learning material related to the course. Also, self-assessment of material learned to see how you are doing before an evaluation.
		Negative Reactions
NOTC	M	Instead of introducing new types of technology, more focus needs to be put on improving the shortfalls of current technology (i.e. better graphics for simulator)
NOTC	M	Computers are used to prepare navigation plans and run navigation programs. Over 25% of our time is spent in a simulator – Real life (at sea) needs to be experienced as well.
NOTC	M	The simulator is just that, a simulator. It is no where near as valuable as actual time on a real ship
NOTC	M	No replacement for actual sea-time.
NOTC	M	Technology can't replace the real thing, but people seem to think it can.
NOTC	M	I would rather see more time spent in a realistic environment and not with simulators.
NOTC	M	Training with technology is one of the keys to a successful Naval Officer. However at this level (Junior), we drive ships – not computers – and this CBT coupled with inaccurate simulator training is a deficit to the CF.
CFFSE	M	Simulators and actual equipment. No CBT unless software is developed that ACCURATELY represents the subject. (Yes)
CFFSE	M	More simulators and self paced learning and less long winded lectures and three page long definitions…i.e. more concise, get to the point quicker.
CFFSE	M	Technology that enhances learning about actual equipment and process but does not replace learning with/on the real thing.
NOTC	M	Real multimedia presentations instead of simple PowerPoint slide show. (Yes)
NOTC	M	Technology which gave (sic) a more realistic exposure to the skills we will need in our day-to-day jobs after our training is over.
NOTC	F	More Hands-on. Simulator Training is great, but you can keep the PowerPoint lectures.
NOTC	F	I would prefer hands on training in an actual ship instead of a simulator.

Table 19 – Trainee Comments Concerning Technology Used in Training

Trg Est	Gender (M/F)	Comments
NOTC	F	I am about as computer illiterate as they come and I find I spend more time fighting with the computer than I do on the assignment itself.
NOTC	M	Technology simulating real life situations such as the ship simulators or perhaps a computer strategy game to improve problem solving.
		Indifferent Reactions
NOTC	M	For the expected level of learning and knowledge we require for the end of this course, I believe the right amount of technology is being used.
NOTC	M	I don't care either way.
CFFSE	M	Not sure what technology is available.

Table 20 – Trainee Comments on Why Technology Increases Their Motivation

Trg Est	Gender M/F	Comments
		Technology Improves Instruction
NOTC	M	First, technology allows you to experience "the job" to a certain extent, since real experience is unavailable. Also, mistakes can be made without severe consequences (i.e. running aground in simulator not life-threatening)
NOTC	M	It enables me to learn thus increasing my motivation. The easier it is to learn, the more fun it is.
NOTC	M	With the use of the "new" simulator in Victoria, we are learning on probably the best technology available in the world. How many other 22-year-olds can say that?
NOTC	M	It greatly increases my abilities as an OOW. Gives me more confidence.
NOTC	F	Technology increases my motivation because it increases my interest. The learning does not seem outdated. It seems more applicable to today.
CFFSE	M	Sometimes easier to understand (CBT). Software not working – needs upgrading. Not sure of operating technology.
CFFSE	M	Because it's new and different.
CFFSE	M	Presents the information in new and interesting fashion.
CFFSE	M	Because I am more curious and eager to learn when technology is used.
CFFSE	F	I feel it is essential that we use more technology since it has become a very imminent part of society today.
CFFSE	M	Because you don't get board with it. You're always doing something new with it.
CFFSE	F	I understand it better.
CFFSE	F	I like new things.
CFFSE	M	It makes me more involved.
CFFSE	M	I'm a very "technology" person. Whenever technology is involved in anything, I'm interested.
NOTC	M	It increases my motivation to learn by making it fun, but the greatest benefit I feel is the increased preparedness to go to the Fleet, hence decreasing anxiety.
NOTC	M	Because, in the case of simulator, it increases my participation and therefore my motivation.
NOTC	M	Because you get to directly apply your knowledge and get instant feedback. This prepares you quicker and more fully.
NOTC	M	It's just cause it is not like when you get an instructor in front who's talking with the same voice.
NOTC	F	Having two weeks in the simulator is better than 2 more weeks in classroom or 2 weeks in the Agnew Trainer.
NOTC	M	Keeps my attention focussed. Provides practical hands on experience at limited cost.
NOTC	M	It makes you feel more involved with the goings on of the outside world.
NOTC	F	It is more interesting to actually apply the rules in a simulator than just talk about them in class.
NOTC	M	Technology allows for more "universality" among instructors. In the past, the students were dependent on the instructor's experiences and charisma. With technology, we can visually comprehend a theory.
NOTC	M	Creates a variety from daily schedule of lectures.
NOTC	M	It's not boring like lectures and allows me to get involved and enjoy learning.
NOTC	M	There are often visual presentations allowing comprehension of subject

Table 20 – Trainee Comments on Why Technology Increases Their Motivation

		matter by demonstration.
NOTC	F	Much more interesting! Makes learning easier and fun.
NOTC	F	Because it tries to bring to the classroom a diverse method and unmonotounous way of learning.
		Technology is Motivational Because it Allows for Self Pacing
NOTC	M	Good control of learning conditions.
CFFSE	M	Sense of competition. Learn at own pace.
CFFSE	F	It's fun and at your own time.
CFFSE	F	You go at your own pace and can understand better before moving on.
CFFSE	F	Go at your own pace; clear and precise.
NOTC	M	Instructors teach at a pace, which is suitable for many students. It is usually far too slow for me and I lose interest because I get bored; CBT allows me to advance at a faster rate; exciting!
NOTC	M	If the technology is well designed and stimulating, it increases my motivation. I can go at my own pace and review things when I need to. Training is consistent and does not depend on the presenter's skill level.
		Technology Is Not a Motivator
NOTC	M	It is a very false environment and difficult to accurately assess one's position and distance.
NOTC	M	Looking at computer screens all day won't motivate anybody.
NOTC	M	It is frustrating using simulators. I have no depth perception, due to the technology, and the simulator actually makes my job harder.
NOTC	M	Needs hands-on
CFFSE	M	The technology does not accurately represent the material and often fails to work properly.
NOTC	M	The choice of words in the question does not reflect technology's effect on me. I find the wanton use of technology distracting and perhaps, by extension, it increases my anxiety.
NOTC	F	It's not a computer course, so there is no time to explain the computer programme. I just have to try and figure things out myself.

Table 21 – Trainee Impressions of Technology Used in Training

Trg Est	Gender M/F	Comments
		More Technology Use Desired
NOTC	M	Not enough technology is used
NOTC	M	Instructor should rely more on new technology for instruction. I'd like to see it more in our training.
NOTC	M	Not used to max potential
NOTC	F	I feel that technology could be used more productively. Some computer based aids such as the rules of the road quiz are beneficial.
NOTC	M	It is not used to its full benefit in case of CBT at VENTURE. The simulator is employed quite well however.
NOTC	M	The technology is not used at its full capacity. By example, PowerPoint is just a nice replacement to OHP.
		Technology Use Detracts From Learning
NOTC	M	Use of technology is impressive and for the most part effective, but it cannot substitute for the real thing. Scenarios and situations on the technological level have to be carefully controlled and monitored to produce any real benefit.
NOTC	M	Too many evaluated runs are done in the simulator rather than at sea.
NOTC	M	It is trying to replace the real experience and is failing.
NOTC	M	Too much emphasis on simulator
NOTC	F	The technology used is good; however, I think we should be doing more "real" hands on training.
NOTC	M	We rely too much on it, apparently as a cost saving measure. However, to optimize the level of training, simulators will also become expensive to operate.
NOTC	M	The instructors are too dependent upon PowerPoint. Instructing with a flip of a button is not teaching. Give me the book or let me press the button myself.
CFFSE	M	Get rid of it until it works properly.
CFFSE	M	CBT requires upgrading.
		I don't like computers.
CFFSE	M	It makes it easier on instructors, but sometimes handouts are more beneficial.
CFFSE	M	It's useful and expedient, however all the bugs still need to be worked out.
CFFSE	M	Using technology to replace actual hands-on experience is not very effective.
NOTC	F	I learned quite a bit in the simulator – it does not equate to the real thing and I disagreed with the replacement of actual shipboard time with simulator time.
NOTC	M	They get good technology but they don't use it in the right way.
NOTC	F	The simulator is replacing actual sea time and even though it is helpful, it isn't the real thing.
NOTC	F	Very helpful aid, however, sometimes it is used too heavily and then it becomes a crutch for the instructors instead of an aid.
NOTC	M	It seems to be used in a frivolous manner (e.g. PowerPoint lectures for some sections of the course ended up having more slides than obsolete OHP's).
NOTC	M	Too much PowerPoint lesson. It's more a waste of time than a practical way to learn stuff.

Table 21 – Trainee Impressions of Technology Used in Training		
Trg Est	**Gender M/F**	**Comments**
NOTC	M	There is a heavy reliance on simulators since we are not being put on MCDV's as others before us were.
NOTC	M	The instructors aren't familiar with the technology and therefore, much of the learning potential is wasted.
NOTC	F	Sometimes there is an over emphasis on computer simulator training to replace real life hands on that would be important for a ship's officer (navigation).
		Technology is Used Effectively
NOTC	M	Used to great extent, works well.
NOTC	M	Simulator time is essential
NOTC	M	Save money and has a precise purpose
CFFSE	M	To help the students better understand what is really expected.
CFFSE	M	It was well presented and time was adequately used.
NOTC	M	It allows visual pictures of a greater scheme.
NOTC	F	Effectively. I just wish I knew what was going on.

Table 22 – Additional Comments

Trg Est	Gender M/F	Comments
		Technology Cannot Replace Reality/Poor Implementation
NOTC	M	1. Use of PowerPoint is effective, but shouldn't be used as a crutch – drawing diagrams on the whiteboard/chalkboard is often best way to get the point across. 2. Technology (thus far) cannot replace the real thing and that must be remembered when training people largely through computer means.
NOTC	M	In navigation, the practical aspects of executing a pilotage plan and directing a team are crucial. A simulator provides an opportunity to make mistakes, to learn from them and to form a style. This helps when you go to sea on a ship, but the "real thing" is still the most important.
NOTC	M	It should be used to supplement training, not to replace sea training.
NOTC	F	I wonder if technological aids, specifically the simulator, subtract from the more realistic atmosphere that the simulators replaced? Would I be quicker to learn if I didn't have the safety element the simulator provides in my training?
NOTC	M	Too much emphasis is put on training in the simulator. Yes it is useful, but there is more to being a Naval Officer than to learn how to conn a ship.
NOTC	M	We must realize that simulators and CBT are merely "aids" and they can never replace life in a real work environment.
CFFSE	M	The idea is good but the execution is badly flawed. Instead of trying to be "cutting edge" on a shoestring budget, fund and apply it properly!
		I'd rather experience hands on training and talk to real people. Computers should be used as little as possible.
CFFSE	M	Questionnaire skewed to favour technology. CBT more interesting than dry lectures, but actual hands on training in current mock-ups would be best.
CFFSE	M	The PowerPoint computer presentations in class need to be redone, as well, faster computers or programs need to be used with it. Not to mention reusable study information (e.g. study booklets)
NOTC	F	1. PowerPoint is used to death at VENTURE. 2. The simulator is great, however, it should be not replace the sea phase of MARS III. 3. Technology is great to have, however it can be, and is, over used at times and it should not be used to replace the real thing.
		Increased Access To or Use of Technology Required
NOTC	M	We should spend more time in the simulator as OOW.
CFFSE	M	Most of the technology requires upgrading. It takes to long for upgrades to happen – reason – costs money. This should not determine the reason for problems with the technology. Most suggestions for improvement in training appear to take to long to happen because of the route it has to take.
CFFSE	M	The computer in class lectures are to slow and outdated.
CFFSE	M	It would be beneficial, if we could afford it, if there was some access to computers, land-based phones and the Internet Nelles Block. This would provide a better platform from which to launch technology-based learning.
NOTC	M	It is not a question of whether technology is incorporated into a

Table 22 – Additional Comments

Trg Est	Gender M/F	Comments
		training plan that counts. Rather, the discreet use of it to enhance the one-on-one communication is what makes it beneficial.
NOTC	M	Use it more and explain why it is being used.
NOTC	M	More time working on a computer rather than watching PowerPoint slides would be beneficial if appropriate software programs could be developed for training.
NOTC	M	Technology is incorporated in the modern systems, which we will be working with; there should be no question of the value of its use during training.
NOTC	M	More time should be set aside to use the CBT training, which is available. Instruction in use of computer and software should be available for those that are not very computer literate. Use of simulators and CBT needs to be carefully monitored to ensure learning meets requirements.

Summary

Sixty-eight trainees and 12 instructors responded to this study – 43 from NOTC and 21 from CFFSE. In general, respondents have a high level of technological literacy with most owning a computer and having access to the Internet. Of the technologies used in training, simulators and CBT received the most support, although more training on actual equipment was a recurring theme. Both instructors and trainees indicated that technology was used effectively in training, though there appears to be room for improvement. Many indicated that they would use the same technology in future courses.

CHAPTER 5

SUMMARY AND CONCLUSIONS

Details of the Study

This study measured the reactions of trainees and instructors in the Canadian Navy to the use of technology in training. Specifically the research sought to answer the following question: *what are the reactions of trainees towards the use of technology in the Canadian Navy*? To answer the research question, several options were available. Personal interviews with students and staff combined with detailed observations of courses was the initial methodology selected. However, a request by the Navy to limit the amount of interference with daily training activities of the study population and time limitations imposed upon the investigator by the CF meant that a more expedient process of data collection was necessary. Therefore, survey research was chosen as the methodology for the study.

Two Naval Training Establishments served as the population for the study. Respondents were selected from courses conducted at The Naval Officer Training Centre (NOTC) in Victoria, British Columbia and the Canadian Forces Fleet School Esquimalt (CFFSE), also in Victoria. NOTC is home to all introductory officer training in the Navy and is responsible for ensuring graduates are able to meet the basic requirements for shiphandling and navigation before entering the Fleet. CFFSE provides training for Non Commissioned Members (NCMs) who will serve in Tribal Class Destroyers. Training ranges from highly specialized technical training in areas of weapon repair and maintenance to more generalized training in areas such as shipboard routines and naval traditions. Both schools make extensive use of training technology.

To obtain data for the study two questionnaires were developed. One was administered to trainees and the other to instructors. Students and instructors were asked to comment on their level of technology use and reactions to media use in current training in addition to offering general comments on the implementation and use of the technology. Questionnaires were emailed to liaison officers in each school for distribution and administration. The investigator collected the completed surveys during a site visit to both schools one-week later. In total, 68 trainees and 12 instructors responded to the survey. This represents the entire population of each school during the survey period.[1] Once returned, questionnaires were coded and prepared for analysis. Each questionnaire comprised several forced-choice questions, although open-ended items were used to obtain more detailed comments for certain inquiries. Closed-ended items were tabulated with the aid of a computerized statistical package and open-ended questions were transcribed into a word processor for later analysis. The resultant data provided a descriptive analysis of trainee and instructor reactions to the use of technology in the two training establishments. Since this study represents an initial attempt at assessing the level of trainee satisfaction with the use of technology for training in the navy, no specific hypothesis was examined. Instead, the study reports trends and serves as a point of departure for future research.

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[1] Enrollments in Naval Training establishments fluctuate over the year. Enrollments are highest between the months of May-August for NOTC. This is due to the number of students attending Royal Military College of Canada (RMC) who take training over the summer and Reserve trainees who attend instruction during their summer break from civilian universities. For NCM training, recent reductions in recruiting have lowered the number of courses needed. Furthermore, many of the courses offered by CFFSE are *career courses* – meaning trainees attend in order to achieve a qualification for promotion or re-assignment. These courses are only offered when there is a significant demand.

Conclusions From the Research

Based on the data, several conclusions about the use of technology in the Navy can be offered. First, the results indicate that trainees in the study population have a higher level of computer use. Just over 44% of respondents' indicated they could access the Internet from home. Computer ownership figures for the study respondents are is high as well. Previous studies of computer owners has indicated that incomes, educational levels and use of computers on the job are some of the main factors that influence ownership of computers and acceptance of new technology (Dickinson & Sciadas, 1999; Rogers, 1995; Garland, 1991). The findings of this study reflect this research. As a minimum, officers in the CF are required to have at least an undergraduate degree. Many have advanced degrees or received specialized military training in disciplines such as engineering or communications, which require a high level of technology use. For NCMs, many of the occupations in the navy require community college or vocational training for admission. Furthermore, a significant portion of the MOC training they receive is highly technical and makes extensive use of computers. It is also probable that, because CF personnel are Federal Government employees and pay rates are much higher than the national averages, there is more opportunity to purchase computers and associated equipment.

In keeping with the positive attitudes towards technology noted above, many of the respondents indicated that technology was a useful addition to their training. The least preferred technologies were those belonging to Categories 1 and 2, while items from Categories 3 and 4 received the largest support (see Chapter 1 for a detailed explanation of training technology categories). Therefore, the results indicate a preference on the part of trainees to move away from traditional instructor led models and adopt a more technologically enabled and interactive approach to training. Many respondents indicated that not enough technology was used in training and requested more opportunities to learn with simulators and multimedia. A majority of students responded that Category 3 and Category 4 technologies increase their motivation to learn while traditional classroom instruction lowers it. Instructors also reported a belief that students were more motivated when simulators and CBT were employed in the training process. Additionally, although no correlation was found, the numbers appear to indicate that female trainees have a higher preference for technology based training than more conventional methods such as Afloat training.

Not all of the findings were positive. While most trainees believed their instructors did a good job of incorporating technology into training, several expressed concerns over the continued reliance on PowerPoint presentations during classroom lectures. Many respondents indicated this was annoying and often detracted from the learning experience. This indicates that while training establishments are implementing new training technologies, many of the concerns identified by Cuban (1986) and Johnston (1987) with regards to lack of instructor training and professional development are occurring. This is reinforced by the responses of the instructors themselves who indicated that they received very little training in advance of the new technology being implemented. This finding is a concern because the NOTC and CFFSE instructional cadre is composed of Subject Matter Experts (SMEs) who are provided with basic courses in instructional technique prior to entering the classroom. As such, opportunities for professional development are limited and extended periods of internship or mentoring for new instructors is not possible. Therefore, as more technology is incorporated into the training programs of the Navy, comprehensive instructor training must receive a higher priority. In particular, future training must offer guidance and support to assist instructors in making the transition from operational personnel to classroom instructor. Failure to address this deficiency will have serious consequences for the effectiveness of training.

Recommendations for Further Study

Using the above findings and conclusions as a reference point, it is possible to offer some recommendations for future research into the use of training technology in the Navy. First, the issues associated with instructor training require more detailed study to determine the full extent of the problem. Specifically, future research should examine what model of instructor training is best suited to the Navy. The large infusion of training technology is making the traditional model of instruction obsolete. As training becomes more student centered and interactive, instructors will need more training in areas such as learning theory, educational psychology and instructional techniques. Additionally, the model of selecting instructors should be reviewed as part of this research. Adjustments may be necessary to ensure instructors are selected who can develop the necessary skills to effectively teach with the high levels of technology presently in the system.

Despite this concern, the study results show a high level of support among trainees for the continued use of technology in training. This validates the suggestions of the AATE Study (1991) presented in Chapter 1. In fact, this study indicates that trainees are willing to accept even higher levels of technology use than are currently in place. However, further research is required to verify this claim. Because the scope of this study was limited to two training establishments out of five, more responses are necessary to generalize across all Naval Training Establishments. Furthermore, variations in curriculum between establishments and differing backgrounds of trainees may affect the results. Therefore, to ensure the results reported here reflect the opinions and attitudes of all naval trainees, it is recommended that future studies include trainees from all five naval training establishments. Interviews or surveys should be administered during peak training periods (i.e. May-August) to ensure maximum participation. Additionally, future studies may wish to use more detailed data gathering techniques such as personal interviews, focus groups and classroom observations. This would help eliminate many of the shortcomings noted in this study and ensure a solid statistical base for future inferences. As a second consideration for future research, the scope of this study should be expanded to include the entire CF training population. Because recruiting patterns, job specifications and technology use vary significantly across the three branches of the military (Army, Navy and Air Force), the results noted here may be limited to the Navy. If future studies are designed to gather reactions in all CF Training Establishments, consideration should be given to representative sampling procedures to limit the cost and time factors involved in the study. The results of such a study will offer important conclusions for future technology initiatives within the CFITES.

In the same vein, future studies may wish to take a closer look at the appeal of technology based for female trainees in the Canadian Forces. Although not supported empirically, the study results do show a strong relationship between the use of technology in training and improved motivation for female trainees. A more detailed investigation of this relationship could determine if this is an indication of technology's ability to offer a non-threatening training environment.

As a final note, there is merit in periodically replicating this study over the next three to five years. Since a number of the innovations discussed in this study (such as simulation and web based training) are just beginning to be widely adopted by training establishments, it is difficult to tell if the results indicate a high level of support for the technologies or simply provide evidence of a *novelty effect*. Re-administering the questionnaire over a three to five year period will allow more precise tracking of trainee reactions and provide solid evidence of support or indications of the novelty effect. If support for any of the technologies noted here begins to drop, it may signal the presence of a novelty effect, while consistent results will define a strong level of support for the new instructional model generated by technology adoption. Consideration should also be given to identifying the innovators, change agents and early adopters within Training Establishments, as these individuals may be beneficial in increasing the effectiveness of technology use.

Summary

In general, the results of this study seem to indicate that the adoption of new technology into Naval training has been received positively by both staff and students. Currently trainee motivation to learn appears high and instructors believe the new methods are a considerable improvement over past practices. Technophobia (Gayeski, 1997) appears almost non-existent in the study population. Support for increased use of the technology is high, although many prefer training on actual equipment. Future studies may wish to expand the scope of this inquiry to include all five Naval training establishments or all Training Establishments in the CF. Periodic replication of the study is recommended to ensure results are not biased by the presence of a *novelty effect* associated with the new technology.

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APPENDIX ONE

TRAINEE QUESTIONNAIRE

INSTRUCTIONS FOR COMPLETION

This questionnaire is designed to gather information on trainee reactions to the use of training technology in the Canadian Forces. Specifically, I am interested in measuring your reactions to the technology employed in your training.

Many of the questions that follow can be answered by placing a check mark in the appropriate box (✓). Please select only one response for each question unless otherwise requested. Some of the questions ask you to comment or provide additional remarks; for those questions, please write your response in the space provided. If you require extra space, use the back of the last page. Number your written response(s) in accordance with the appropriate question.

The questionnaire should take 20-30 minutes to complete. All replies will be kept confidential. ***Do not write your name or service number on the questionnaire.*** When you have completed the questionnaire, please place it the envelope provided and return it to the supervisor. Your cooperation is greatly appreciated.

Thank you for your assistance.

PART I - This section of the questionnaire will gather information about your familiarity with computers and technology in general. Please check only one response for each question.

1. Do you own a computer?

   1 (__) Yes

   2 (__) No

2. How many years have you been using a computer?

   1 (__) Less than 1 year   2 (__) 1-3 years

   3 (__) 3-5 years   4 (__) over 5 years

   5 (__) I don't use a computer

3. Which one of the following tasks do you use your computer for the **most**? (check only one)

   1 (__) Word Processing/Letter Writing

   2 (__) Surfing the Internet

   3 (__) Sending/Receiving Email

   4 (__) Building Web Pages

   5 (__) Developing Databases

   6 (__) Playing Computer Games

   7 (__) I don't own a computer

4. Using the categories provided, please rate how often you use your computer for the task described above.

Task	Almost Daily	2-3times/wk	2-3 times/mnth	Never
Word Processing	1 (__)	2 (__)	3 (__)	4 (__)
Surfing the Internet	1 (__)	2 (__)	3 (__)	4 (__)
Sending/Receiving Email	1 (__)	2 (__)	3 (__)	4 (__)
Building Web Pages	1 (__)	2 (__)	3 (__)	4 (__)
Developing Databases	1 (__)	2 (__)	3 (__)	4 (__)
Playing Computer Games	1 (__)	2 (__)	3 (__)	4 (__)
Spreadsheets/Accounting	1 (__)	2 (__)	3 (__)	4 (__)

5. Listed below are several types of technologies. For each item listed, please specify if you own, intend to purchase or don't use it.

Item	Own	Intend to Purchase	Don't Use
Pentium Class PC	1 (__)	2 (__)	3 (__)
VCR	1 (__)	2 (__)	3 (__)
Television	1 (__)	2 (__)	3 (__)
35mm Camera	1 (__)	2 (__)	3 (__)
Video Camera	1 (__)	2 (__)	3 (__)
Digital Camera	1 (__)	2 (__)	3 (__)
Fax Machine	1 (__)	2 (__)	3 (__)
Cellular Phone	1 (__)	2 (__)	3 (__)
DVD Player	1 (__)	2 (__)	3 (__)
Nintendo System	1 (__)	2 (__)	3 (__)

6. Do you have access to the Internet at home?

1 (__) Yes

2 (__) No

7. Which of the following do you use the Internet for the **most**? (check only one)

1 (__) Email

2 (__) Research/Information

3 (__) Online Commerce

4 (__) Training Courses/Professional Development

5 (__) "Surfing"

6 (__) Playing "Online" Games

7 (__) I don't have access to the Internet

8. Which of the following do you use the Internet for the **least**? (check only one)

1 (__) Email

2 (__) Research/Information

3 (__) Online Commerce

4 (__) Training Courses/Professional Development

5 (__) "Surfing"

6 (__) Playing "Online" Games"

7 (__) I don't have access to the Internet

9. How would you rate your level of confidence with computers and technology in general?

1 (__) High

2 (__) Medium

3 (__) Low

10. What is your general impression of the technology used in your training?

1 (__) Very positive   2 (__) Positive

3 (__) Acceptable   4 (__) It adds little value to the training

11. Do you agree or disagree with the following statement: ***Technology, such as Simulators and Multimedia Computer Instruction, improves the quality of my training in the CF.***

1 (__) Strongly agree   2 (__) Agree

3 (__) Disagree   4 (__) Strongly Disagree

12. If you did not agree with the above statement, please explain why below. If you agreed with the statement, go to question 13.

____

____

____

13. Which of the following do you find the **most** beneficial to your training?

1 (___) Textbooks 2 (___) Instructor Lectures

3 (___) Simulator Training 4 (___) Multimedia Computer Training Programs

5 (___) Other (Please Specify)

____

14. Which of the following do you find the **least** beneficial to your training?

1 (___) Textbooks 2 (___) Instructor Lectures

3 (___) Simulator Training 4 (___) Multimedia Computer Training Programs

5 (___) Other (Please Specify)

____

PART II. *This section of the questionnaire will gather information about your reaction to the various types of technology in your military training. Please select the appropriate response to the question.*

14. Listed below are various technologies used in CF Training. For each item, please rate the appeal of each on a scale of 1 -4 (1= No appeal and 4 = High appeal). For example if you find Overhead Projectors to have no appeal in your training you would circle 1, some appeal 2 and so on up the scale. Please circle only one response for each item.

<u>Training Media</u>		<u>Level of Appeal</u>				
Overhead Projectors	No Appeal	1	2	3	4	High Appeal
Videotapes	No Appeal	1	2	3	4	High Appeal
Films	No Appeal	1	2	3	4	High Appeal
Chalkboard/Whiteboard	No Appeal	1	2	3	4	High Appeal
Textbooks	No Appeal	1	2	3	4	High Appeal
Study Packages	No Appeal	1	2	3	4	High Appeal
PowerPoint Presentations	No Appeal	1	2	3	4	High Appeal
35mm Slide Shows	No Appeal	1	2	3	4	High Appeal
Computer Based Training	No Appeal	1	2	3	4	High Appeal
Simulator Training	No Appeal	1	2	3	4	High Appeal

Training on Actual Eqpmnt	No Appeal	1	2	3	4	High Appeal
Guest Lecturers	No Appeal	1	2	3	4	High Appeal
Field Trips	No Appeal	1	2	3	4	High Appeal
Classroom Lectures	No Appeal	1	2	3	4	High Appeal

15. Using the scale below, please identify the number of times per course you are exposed to each type of training technology.

<u>Training Media</u>	<u>Everyday</u>	<u>2-3 times/week</u>	<u>1-2 times/course</u>	<u>Never</u>
Overhead Projectors	1 (__)	2 (__)	3 (__)	4 (__)
Videotapes	1 (__)	2 (__)	3 (__)	4 (__)
Films	1 (__)	2 (__)	3 (__)	4 (__)
Chalkboard	1 (__)	2 (__)	3 (__)	4 (__)
Textbooks	1 (__)	2 (__)	3 (__)	4 (__)
Study Packages	1 (__)	2 (__)	3 (__)	4 (__)
35mm Slide Shows	1 (__)	2 (__)	3 (__)	4 (__)
PowerPoint Slides	1 (__)	2 (__)	3 (__)	4 (__)
Multimedia Training	1 (__)	2 (__)	3 (__)	4 (__)
Simulator Training	1 (__)	2 (__)	3 (__)	4 (__)
Trg on Actual Eqpmnt	1 (__)	2 (__)	3 (__)	4 (__)
Guest Lecturers	1 (__)	2 (__)	3 (__)	4 (__)
Field Trips	1 (__)	2 (__)	3 (__)	4 (__)
Classroom Lectures	1 (__)	2 (__)	3 (__)	4 (__)
Live Demos	1 (__)	2 (__)	3 (__)	4 (__)

16. Which of the following technologies is used <u>**most often**</u> in your training? (Please check only one)

1 (__) Overhead Projectors	2 (__) Videotapes	3 (__) Films
4 (__) Chalkboards	5 (__) Textbooks	6 (__) Lectures
7 (__) PowerPoint Presentations	8 (__) 35mm Slides	9 (__) Live Demos
10 (__) Computer Based Training	11 (__) Field trips	12 (__) Simulators

17. For each item listed below, please indicate if you would like to see it used more, used less or not at all during your training.

Technology	**Used More**	**Used Less**	**Not At All**
Overhead Projectors	1 (__)	2 (__)	3 (__)
Videotapes	1 (__)	2 (__)	3 (__)
Films	1 (__)	2 (__)	3 (__)
Chalkboard	1 (__)	2 (__)	3 (__)
Textbooks	1 (__)	2 (__)	3 (__)
Study Packages	1 (__)	2 (__)	3 (__)
35mm Slide Shows	1 (__)	2 (__)	3 (__)
Computer Slides	1 (__)	2 (__)	3 (__)
Multimedia Training	1 (__)	2 (__)	3 (__)
Simulator Training	1 (__)	2 (__)	3 (__)
Trg on Actual Eqpmnt	1 (__)	2 (__)	3 (__)
Guest Lecturers	1 (__)	2 (__)	3 (__)
Field Trips	1 (__)	2 (__)	3 (__)
Classroom Lectures	1 (__)	2 (__)	3 (__)
Live Demos	1 (__)	2 (__)	3 (__)

18. On average what percentage of your course training time would you say involves the use of Computer Based Training (CBT)?

1 (__) Less than 10%	2 (__) 10-25%
3 (__) 26-40%	4 (__) 41-50%
5 (__) 51-60%	6 (__) 61-75%
7 (__) Over 75%	8 (__) CBT is not used in the course

19. On average what percentage of your course training time would you say involves the use of Simulators?

1 (__) Less than 10%	2 (__) 10-25%
3 (__) 26-40%	4 (__) 41-50%
5 (__) 51-60%	6 (__) 61-75%
7 (__) Over 75%	8 (__) Simulators are not used in the course

20. Would you say that too much or not enough course time is spent using Computer Based Training?

1 (___) Too Much Time

2 (___) Just about the right mix of Classroom Training and CBT

3 (___) Not enough time is spent using CBT

4 (___) CBT is not used in this course

21. Would you say that too much or not enough course time is spent using Simulators?

1 (___) Too Much Time

2 (___) Just about the right mix of Classroom Training and Simulator Training

3 (___) Not enough time is spent using Simulator

4 (___) Simulators are not used in this course

22. When a new technology, such as a simulator or computer based training package, is introduced during your training what is your reaction to its use?

1 (___) Very positive

2 (___) Curious, but unsure of the benefits

3 (___) Apprehensive

4 (___) It has no effect on me. It's just another tool for training and learning.

5 (___) I prefer no technology in my training.

23. Would you like to see more technology used in your training?

1 (___) Yes

2 (___) No

24. If you answered "yes" above, what types of technology would you like to see used in your training? If you answered "no", please explain why below.

____

____

____

25. The use of technology during training…

    1 (__) increases my motivation to learn

    2 (__) increase my anxiety

    3 (__) decreases my motivation to learn

    4 (__) decreases my anxiety

    5 (__) it has no effect on me.

26. If the use of technology during instruction increases your motivation please explain why below. Conversely, if you said it doesn't or that it increases your anxiety, please explain why below. If it has no effect on you, go to the next question.

    ____

    ____

    ____

    ____

27. As a general rule, how would you regard the use of technology in your training?

    1 (__) it is very beneficial to the training

    2 (__) it has some advantages during training

    3 (__) it has little benefit to the training

    4 (__) I don't think any technology should be used in my training.

28. Overall, do you think your instructors make effective use of technology in training?

    1 (__) Yes

    2 (__) No

29. Does it appear to you that technology is being used for a specific purpose in training or just because it is new?

    1 (__) it has a specific purpose in the training

    2 (__) it is used just because it's new

    3 (__) not sure why it is used

30. When a new technology is introduced during your training, is its relationship to the job or specific training role explained to you?

1 (___) Yes

2 (___) No

31. Do you think your motivation to learn would be higher or lower if you knew the purpose of using a specific technology during your training?

1 (___) Higher

2 (___) Lower

3 (___) My motivation would not change

(___) Not sure

32. Would you use the same technology to instruct this course?

1 (___) Yes

2 (___) No

33. If you answered "No" above, please explain your answer and specify what technology (if any) you would use to instruct this course.

____

____

34. If your training incorporates the use of a simulator, please rate your general impressions of the its contributions to your learning. If not, go to question 36.

1 (___) It is an excellent addition to the course. I find it very helpful.

2 (___) It is a useful aid, but I think I could learn as much without it.

3 (___) It interferes with my training. I would prefer it it wasn't used.

4 (___) I have no opinion.

35. If your training incorporates the use of computer based training, please rate your general impressions of the its contributions to your learning. If not, go to question 37.

1 (___) It is an excellent addition to the course. I find it very helpful.

2 (___) It is a useful aid, but I think I could learn as much without it.

3 (___) It interferes with my training. I would prefer it it wasn't used.

4 (___) I have no opinion.

36. What are your general impressions of the way technology is used in your training?

____

____

____

37. Are there any other comments you would like to add about the use of technology in your training?

____

____

____

____

____

PART III. *In order to analyze the data from the previous two sections, some background information is necessary. Please complete the following questions. All the information will be kept confidential. Your cooperation is appreciated.*

38. Are you male or female?

1 (____) Male

2 (____) Female

39. Your age is.....

1 (__) 16-18 | 4 (__) 26-30

2 (__) 18-21 | 5 (__) 31-35 | 7 (__) Over 40

3 (__) 22-25 | 6 (__) 35-40

40. Your Marital Status is...

1 (__) Single | 2 (__) Married

3 (__) Divorced | 4 (__) Widowed

41. Your Official Language is....

1 (__) French | 3 (__) Both

2 (__) English

42. Your rank is.....

1 (___) Pte/OS
2 (___) Cpl/LS
3 (___) MCpl/MS
4 (___) Sgt/PO2
5 (___) WO/PO1
6 (___) MWO/CPO2
7 (___) CWO/CPO1
8 (___) OCdt/NCdt
9 (___) 2Lt/A-Slt
10 (___) Lt/Slt
11 (___) Capt/Lt (N)
12 (___) Maj/LCdr
13 (___) LCol/Cdr
14 (___) Other (Please Specify) ________________

43. You are a member of the....

1 (___) Regular Force
2 (___) Reserve Force
3 (___) Cadet Instructor Cadre

44. What course are you attending? (please specify below)

____

____

If you are an OCdt or above, please answer the following 2 questions. If you are not, you are finished the questionnaire. Thank you for your cooperation.

45. What is your entry plan?

1 (___) ROTP
2 (___) DEO
3 (___) OCTP
4 (___) UTPNCM
5 (___) RETP
6 (___) SUEP
7 (___) Other (please specify) ______________________

46. Your highest level of education is…

1 (___) High School

2 (___) Bachelor Degree (RMC)

3 (___) Bachelor Degree (Civilian University)

4 (___) Community College/CEGEP

5 (___) Graduate Degree (Masters or Doctorate)

FINAL INSTRUCTIONS:
Thank you for taking the time to complete this questionnaire. ***DO NOT sign or date this questionnaire.*** Please place it in the attached envelope and return it to the supervisor. All of your answers are confidential and will only be used for research purposes.

APPENDIX TWO

INSTRUCTOR QUESTIONNAIRE

INSTRUCTIONS FOR COMPLETION

This questionnaire is designed to gather instructor reactions to the use of training technology in the Canadian Forces. Specifically, I am interested in measuring your reactions to the technology employed in your Training Establishment.

Many of the questions that follow can be answered by placing a check mark in the appropriate box (_✓_). Please select only one response for each question unless otherwise requested. Some of the questions ask you to comment or provide additional remarks; for those questions, please write your response in the space provided. If you require extra space, use the back of the last page. Number your written response(s) in accordance with the appropriate question.

The questionnaire should take 20-30 minutes to complete. All replies will be kept confidential. ***Do not write your name or service number on the questionnaire.*** When you have completed the questionnaire, please place it the envelope provided and return it to the supervisor. Your cooperation is greatly appreciated.

Thank you for your assistance.

PART I - This section of the questionnaire will gather information about your familiarity with computers and technology in general. Please check only one response for each question.

4. Do you own a computer?

   1 (__) Yes

   2 (__) No

5. How many years have you been using a computer?

   1 (__) Less than 1 year   2 (__) 1-3 years

   3 (__) 3-5 years   4 (__) over 5 years

   5 (__) I don't use a computer

6. Which one of the following tasks do you use your computer for the **most**? (check only one)

   1 (__) Word Processing/Letter Writing

   2 (__) Surfing the Internet

   3 (__) Sending/Receiving Email

   4 (__) Building Web Pages

   5 (__) Developing Databases

   6 (__) Playing Computer Games

   7 (__) I don't own a computer

4. Using the categories provided, please rate how often you use your computer for the task described above.

Task	Almost Daily	2-3times/wk	2-3 times/mnth	Never
Word Processing	1 (__)	2 (__)	3 (__)	4 (__)
Surfing the Internet	1 (__)	2 (__)	3 (__)	4 (__)
Sending/Receiving Email	1 (__)	2 (__)	3 (__)	4 (__)
Building Web Pages	1 (__)	2 (__)	3 (__)	4 (__)
Developing Databases	1 (__)	2 (__)	3 (__)	4 (__)
Playing Computer Games	1 (__)	2 (__)	3 (__)	4 (__)
Spreadsheets/Accounting	1 (__)	2 (__)	3 (__)	4 (__)

6. Listed below are several types of technologies. For each item listed, please specify if you own, intend to purchase or don't use it.

Item	Own	Intend to Purchase	Don't Use
Pentium Class PC	1 (__)	2 (__)	3 (__)
VCR	1 (__)	2 (__)	3 (__)
Television	1 (__)	2 (__)	3 (__)
35mm Camera	1 (__)	2 (__)	3 (__)
Video Camera	1 (__)	2 (__)	3 (__)
Digital Camera	1 (__)	2 (__)	3 (__)
Fax Machine	1 (__)	2 (__)	3 (__)
Cellular Phone	1 (__)	2 (__)	3 (__)
DVD Player	1 (__)	2 (__)	3 (__)
Nintendo System	1 (__)	2 (__)	3 (__)

6. Do you have access to the Internet at home?

1 (__) Yes

2 (__) No

7. Which of the following do you use the Internet for the **most**? (check only one)

1 (___) Email

2 (___) Research/Information

3 (___) Online Commerce

4 (___) Training Courses/Professional Development

5 (___) "Surfing"

6 (___) Playing "Online" Games

7 (___) I don't have access to the Internet

8. Which of the following do you use the Internet for the **least**? (check only one)

1 (___) Email

2 (___) Research/Information

3 (___) Online Commerce

4 (___) Training Courses/Professional Development

5 (___) "Surfing"

6 (___) Playing "Online" Games"

7 (___) I don't have access to the Internet

9. How would you rate your level of confidence with computers and technology in general?

1 (___) High

2 (___) Medium

3 (___) Low

15. What is your general impression of the technology used in your training?

1 (___) Very positive   2 (___) Positive

3 (___) Acceptable   4 (___) It adds little value to the training

16. Do you agree or disagree with the following statement: ***Technology, such as Simulators and Multimedia Computer Instruction, improves the quality of my instruction in the CF.***

1 (___) Strongly agree   2 (___) Agree

3 (___) Disagree   4 (___) Strongly Disagree

17. If you did not agree with the above statement, please explain why below. If you agreed with the statement, go to question 13.

____

____

____

18. As an Instructor, which of the following do you find the **most** beneficial to your students?

1 (___) Textbooks   2 (___) Instructor Lectures

3 (___) Simulator Training   4 (___) Multimedia Computer Training Programs

5 (___) Other (Please Specify)

____

19. As an Instructor, which of the following do you find the **least** beneficial to your students?

1 (___) Textbooks   2 (___) Instructor Lectures

3 (___) Simulator Training   4 (___) Multimedia Computer Training Programs

5 (___) Other (Please Specify)

____

PART II. *This section of the questionnaire will gather information about your reaction to the various types of technology in your military training. Please select the appropriate response to the question.*

14. Listed below are various technologies used in CF Training. For each item, please rate the appeal of each on a scale of 1 -4 (1= No appeal and 4 = High appeal). For example if you find Overhead Projectors to have no appeal in your training you would circle 1, some appeal 2 and so on up the scale. Please circle only one response for each item.

Training Media		**Level of Appeal**				
Overhead Projectors	No Appeal	1	2	3	4	High Appeal
Videotapes	No Appeal	1	2	3	4	High Appeal
Films	No Appeal	1	2	3	4	High Appeal
Chalkboard/Whiteboard	No Appeal	1	2	3	4	High Appeal
Textbooks	No Appeal	1	2	3	4	High Appeal
Study Packages	No Appeal	1	2	3	4	High Appeal
PowerPoint Presentations	No Appeal	1	2	3	4	High Appeal
35mm Slide Shows	No Appeal	1	2	3	4	High Appeal
Computer Based Training	No Appeal	1	2	3	4	High Appeal

Simulator Training	No Appeal	1	2	3	4	High Appeal
Training on Actual Eqpmnt	No Appeal	1	2	3	4	High Appeal
Guest Lecturers	No Appeal	1	2	3	4	High Appeal
Field Trips	No Appeal	1	2	3	4	High Appeal
Classroom Lectures	No Appeal	1	2	3	4	High Appeal

15. Using the scale below, please identify the number of times per course you use each type of training technology.

Training Media	Everyday	2-3 times/week	1-2 times/course	Never
Overhead Projectors	1 (__)	2 (__)	3 (__)	4 (__)
Videotapes	1 (__)	2 (__)	3 (__)	4 (__)
Films	1 (__)	2 (__)	3 (__)	4 (__)
Chalkboard	1 (__)	2 (__)	3 (__)	4 (__)
Textbooks	1 (__)	2 (__)	3 (__)	4 (__)
Study Packages	1 (__)	2 (__)	3 (__)	4 (__)
35mm Slide Shows	1 (__)	2 (__)	3 (__)	4 (__)
PowerPoint Slides	1 (__)	2 (__)	3 (__)	4 (__)
Multimedia Training	1 (__)	2 (__)	3 (__)	4 (__)
Simulator Training	1 (__)	2 (__)	3 (__)	4 (__)
Trg on Actual Eqpmnt	1 (__)	2 (__)	3 (__)	4 (__)
Guest Lecturers	1 (__)	2 (__)	3 (__)	4 (__)
Field Trips	1 (__)	2 (__)	3 (__)	4 (__)
Classroom Lectures	1 (__)	2 (__)	3 (__)	4 (__)
Live Demos	1 (__)	2 (__)	3 (__)	4 (__)

16. Which of the following technologies do you use **most often** when instructing a course? (Please check only one)

1 (__) Overhead Projectors	2 (__) Videotapes	3 (__) Films
4 (__) Chalkboards	5 (__) Textbooks	6 (__) Lectures
7 (__) PowerPoint Presentations	8 (__) 35mm Slides	9 (__) Live Demos
10 (__) Computer Based Training	11 (__) Field trips	12 (__) Simulators

22. For each item listed below, please indicate if you plan on using it more, less or not at all in your current or next course than in previous courses.

Technology	Used More	Used Less	Not At All
Overhead Projectors	1 (__)	2 (__)	3 (__)
Videotapes	1 (__)	2 (__)	3 (__)
Films	1 (__)	2 (__)	3 (__)
Chalkboard	1 (__)	2 (__)	3 (__)
Textbooks	1 (__)	2 (__)	3 (__)
Study Packages	1 (__)	2 (__)	3 (__)
35mm Slide Shows	1 (__)	2 (__)	3 (__)
Computer Slides	1 (__)	2 (__)	3 (__)
Multimedia Training	1 (__)	2 (__)	3 (__)
Simulator Training	1 (__)	2 (__)	3 (__)
Trg on Actual Eqpmnt	1 (__)	2 (__)	3 (__)
Guest Lecturers	1 (__)	2 (__)	3 (__)
Field Trips	1 (__)	2 (__)	3 (__)
Classroom Lectures	1 (__)	2 (__)	3 (__)
Live Demos	1 (__)	2 (__)	3 (__)

23. On average what percentage of course training time in your school would you say involves the use of Computer Based Training (CBT)?

1 (__) Less than 10%　　2 (__) 10-25%

3 (__) 26-40%　　4 (__) 41-50%

5 (__) 51-60%　　6 (__) 61-75%

7 (__) Over 75%　　8 (__) None

24. On average what percentage of course training time in your school would you say involves the use of Simulators?

1 (__) Less than 10%　　2 (__) 10-25%

3 (__) 26-40%　　4 (__) 41-50%

5 (__) 51-60%　　6 (__) 61-75%

7 (__) Over 75%　　8 (__) None

25. Would you say that too much or not enough course time is spent using Computer Based Training?

1 (__) Too Much Time

2 (__) Just about the right mix of Classroom Training and CBT

3 (__) Not enough time is spent using CBT

4 (__) CBT is not used in this Training Establishment

26. Would you say that too much or not enough course time is spent using Simulators?

1 (__) Too Much Time

2 (__) Just about the right mix of Classroom Training and Simulator Training

3 (__) Not enough time is spent using Simulator

4 (__) Simulators are not used in this Training Establishment

22. When a new technology, such as a simulator or computer based training package, is offered to you for use in your courses, what is your general reaction?

1 (__) Very positive

2 (__) Curious, but unsure of the benefits

3 (__) Apprehensive

4 (__) It has no effect on me. It's just another tool for training and learning.

5 (__) I prefer no technology in my classroom.

23. As an instructor, would you like to see more technology used in your school?

1 (__) Yes

2 (__) No

24. If you answered "Yes" above, what types of technology would you like to see used? If you answered "No", please explain why below.

____

____

____

30. I believe the use of technology during training...

    1 (___) increases trainee motivation to learn

    2 (___) increases trainee anxiety

    3 (___) decreases trainee motivation to learn

    4 (___) decreases trainee anxiety

    5 (___) has no effect on trainees.

31. If you said the use of technology during instruction increases trainee motivation please explain why below. Conversely, if you said it doesn't or that it increases trainee anxiety, please explain why below. If it has no effect, go to the next question.

    ____

    ____

    ____

32. As a general rule, how would you regard the use of technology in training?

    1 (___) it is very beneficial to the training

    2 (___) it has some advantages during training

    3 (___) it has little benefit to the training

    4 (___) I don't think any technology should be used in my training.

33. Overall, do you think you make effective use of technology in training?

    1 (___) Yes

    2 (___) No

34. Do you think your peers make effective use of technology in their instruction?

    1 (___) Yes

    2 (___) No

    3 (___) Don't Know

35. Does it appear to you that technology is being used for a specific purpose in training or just because it is new?

    1 (___) it has a specific purpose in the training

    2 (___) it is used just because it's new

    3 (___) not sure why it is used

36. When a new technology is introduced in your Training Establishment, are you given training on how to use it during instruction?

    1 (__) Yes

    2 (__) No

37. Do you think trainee motivation to learn would be higher or lower if they knew the purpose of using a specific technology during training?

    1 (__) Higher

    2 (__) Lower

    3 (__) Trainee motivation would not change

    4 (__) Not sure

38. Reflecting on your last or current course, would you use the same technology again to instruct?

    1 (__) Yes

    2 (__) No

39. If you answered "No" above, please explain your answer and specify what technology (if any) you would use next time.

____

____

40. If the training in your school incorporates the use of a simulator, please rate your general impressions of the its contribution to the course(s) it supports. If a simulator is not used, go to question 36.

    1 (__) It is an excellent addition to the course. I find it very helpful.

    2 (__) It is a useful aid, but I think students could learn as much without it.

    3 (__) It interferes with training. I would prefer it wasn't used.

    4 (__) I have no opinion.

41. If the training in your school incorporates the use of computer based training, please rate your general impressions of the its contribution to the course(s) it supports. If computer based training is not used, go to question 37.

    1 (__) It is an excellent addition to the course. I find it very helpful.

    2 (__) It is a useful aid, but I think students could learn as much without it.

    3 (__) It interferes with my training. I would prefer it it wasn't used.

    4 (__) I have no opinion.

42. What are your general impressions of the way training technology is used in your school?

____

43. Are there any other comments you would like to add about the use of technology in your school?

____

PART III. *In order to analyze the data from the previous two sections, some background information is necessary. Please complete the following questions. All the information will be kept confidential. Your cooperation is appreciated.*

44. Are you male or female?

1 (___) Male

2 (___) Female

45. Your age is.....

1 (__) 16-18 4 (__) 26-30 7 (__) Over 40

2 (__) 18-21 5 (__) 31-35

3 (__) 22-25 6 (__) 35-40

46. Your Marital Status is...

1 (__) Single 2 (__) Married

3 (__) Divorced 4 (__) Widowed

47. Your Official Language is....

1 (__) French

2 (__) English

3 (__) Both

48. Your rank is.....

1 (__) Pte/OS

2 (__) Cpl/LS

3 (__) MCpl/MS

4 (__) Sgt/PO2

5 (__) WO/PO1

6 (__) MWO/CPO2

7 (__) CWO/CPO1

8 (__) OCdt/NCdt

9 (__) 2Lt/A-Slt

10 (__) Lt/Slt

11 (__) Capt/Lt (N)

12 (__) Maj/LCdr

13 (__) LCol/Cdr

14 (__) Other (Please Specify) ________________

49. You are a member of the....

1 (__) Regular Force

2 (__) Reserve Force

3 (__) Cadet Instructor Cadre

50. What course are you currently instructing (or just completed)? (please specify below)

____

If you are an OCdt or above, please answer the following 2 questions. If you are not, you are finished the questionnaire. Thank you for your cooperation.

51. What is your entry plan?

1 (__) ROTP

2 (__) DEO

3 (__) OCTP

4 (__) UTPNCM

5 (__) RETP

6 (__) SUEP

7 (__) Other (please specify) ______________________

52. Your highest level of education is…

1 (___) High School

2 (___) Bachelor Degree (RMC)

3 (___) Bachelor Degree (Civilian University)

4 (___) Community College/CEGEP

5 (___) Graduate Degree (Masters or Doctorate)

FINAL INSTRUCTIONS:
Thank you for taking the time to complete this questionnaire. ***DO NOT sign or date this questionnaire.*** Please place it in the attached envelope and return it to the supervisor. All of your answers are confidential and will only be used for research purposes.

APPENDIX THREE

LETTER OF TRANSMITTAL

1 September 1998

Dear Respondent:

As part of the requirements for an MA in Educational Technology, I am conducting a survey of trainee and instructor reactions to the use of technology in Canadian Naval Training. You have been selected as a participant in the study. The Director of Navy Personnel Production (DNPP) in Ottawa has granted approval for your participation in the study. The answers you provide will be used to develop strategies for future course design and assist in the implementation of new training technology.

I would request that you complete the attached questionnaire and return it to me. Realizing the time constraints faced during your training, I have designed the questionnaire to require only about 30 minutes of your time.

The information collected by this questionnaire is strictly confidential. Once completed, the survey will be classified PROTECTED B. Furthermore, the results will report only trends and frequencies. Please do not identify yourself in any way on the questionnaire.

If you have any questions regarding the questionnaire or the research, you can contact my Thesis Supervisor, Dr. W. Bruce Clark, or myself, through the Graduate Division of Educational Research at the University of Calgary. The telephone number is (403) 220-5675.

Thank you for your cooperation and participation in the study.

R.L. Legassie
Captain
Training Development Officer
University of Calgary
Post Graduate Training
(403) 242-1604
rllegass@ucalgary.ca

APPENDIX FOUR

RESEARCH CONSENT FORM

Research Consent Form - University of Calgary

Research Project: An Examination of Trainee Reactions to the Use of Technology in Canadian Naval Occupation Training

Investigator: Capt R.L. Legassie, Training Development Officer, University of Calgary

Funding Agency: Director, Recruiting Education and Training, National Defence Headquarters, Ottawa, Ont

This consent form is only part of the process of informed consent. It should give you the basic idea of what the research project is about and what your participation will involve. If you would like more detail about something mentioned here, or information not included here, you should feel free to ask. Please take time to read this carefully and to understand any accompanying information.

Purpose of the Research Project

This research is designed to gather your reactions to the use of technology in your training. Specifically, the research is attempting to identify any positive or negative reactions on the behalf of trainees that affect the way technology is used in CF Individual Training. The results of this study will be used to offer suggestions to improve future training and prepare guidelines for the effective implementation of technology in CF Training.

Experimental Procedures

All of the information required for this study will be obtained through the use of the questionnaire attached. You will be asked specific questions about the use of technology in your training and your reactions to it. All of this information is confidential and classified PROTECTED B on completion of the survey.

Participation Requirements

To participate in this survey, you are asked to complete the attached questionnaire. It should take approximately 20-30 minutes of your time. Most of the questions require a yes or no answer, but some do ask for brief explanations. You are not required to answer all the questions, but your complete participation will enhance data collection and could lead to improvements in the calibre of individual training in the CF.

Confidentiality Procedures

Like all personal data collected in the CF, this information is classified PROTECTED B and subject to all the normal rules and regulations regarding storage and dissemination. Upon completion of the research project, all questionnaires will be destroyed in accordance with the regulations for the disposal of PROTECTED B materials. Your name is not required on the survey. DO NOT identify yourself in any way on the questionnaire. All the personal data required is for tabulation of results only and is limited to items such as age, rank and gender that can be used to draw comparisons among demographic categories.

Publication of Results

All information obtained from this project will be used to generate a research report for fulfillment of a Graduate Degree in Educational Technology at the University of Calgary. Selected results will be included in the study and a copy made available to this Unit, and the Department of National Defense Archives in Ottawa. Should you wish to view the final results, you can do so by making a direct request to the author for a copy of the final document. All costs associated with the preparation of this document will be your responsibility. However, you will be provided free access to the final copy obtained by this Unit.

Your signature on this form indicates that you have understood to your satisfaction the information regarding your participation in the research project and agree to participate as a subject. In no way does this waive your legal rights nor release the investigator, sponsor, or involved institutions from their legal and professional responsibilities. You are free to withdraw from the study at any time (the conditions and procedures for withdrawal should be made available to you). Your continued participation should be as informed as your initial consent, so you should feel free to ask for clarification of new information throughout your participation. If you have further questions concerning matters related to this research, please contact:

Capt R.L. Legassie, Training Development Officer
Telephone/Fax: (403) 242-1604
Email: rllegass@ucalgary.ca

If you have any questions concerning your participation in this project, you may also contact the office of the Vice-President (Research) at the University of Calgary and ask for Karen McDermid at (403) 242-3381.

____
Name (please print)

____
Signature

____
Date