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A STUDY OF THE RELATIVE EFFECTIVENESS OF ALTERNATIVE
INSTRUCTIONAL DELIVERY SCHEDULES FOR ADULT ACHIEVEMENT

by

Wendy A. Gee

B.S. April 1979, University of Michigan

M.S. August 1980, University of Arizona

A Dissertation Submitted to the Faculty of
Old Dominion University in Partial Fulfillment of the
Requirements for the Degree of
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Approved By:

Dwight W. Allen, Dissertation Chair

Member

Concentration Area Director

Member

Dean of College of Education

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Abstract

The purpose of this study was to investigate what effect altering the instructional delivery schedule would have on student achievement and knowledge retention. The independent variable was the training week schedule which was comprised of two treatment conditions. The first level consisted of the conventional five-day training week and the second level was the compressed four-day training week. The dependent variables of the study were student achievement and student descriptive/demographic collateral data.

A quasi-experimental study was employed to compare the two delivery schedules. Two treatment groups were established. Both groups received instruction from the same instructors. Student subjects ($N = 310$) were U.S. Navy and Marine Corps active duty and reserve personnel and Department of Defense civilian employees. Courses were conducted at Fleet Training Center, Naval Station Norfolk, Norfolk, Virginia; Navy and Marine Corps Intelligence Training Center, Dam Neck Naval Station, Virginia Beach, Virginia; Fleet Combat Training Center, Atlantic, Dam Neck Naval Station, Virginia Beach, Virginia; and the United States Marine Corps Base, Camp Lejeune, Lejeune, North Carolina.

Student achievement and student descriptive/demographic collateral data were collected from every student. Student achievement was measured by final examinations and delayed post tests. Student collateral data were collected by an experimenter-developed questionnaire. Analysis of student achievement data revealed that both treatment modes produced a high degree of effective learning as evidenced by final examination results. There was no significant difference between achievement levels and treatment groups. The data also warranted the general conclusion that both treatment groups were significantly less successful in retaining information beyond one month (33 days).

Findings suggest the four-day compressed week schedule was an effective delivery

system for adult learning and retention. Further investigations should focus on manipulation of specific variables included in this study and examination of variables not afforded exploration by this study that will contribute to student achievement and success.

Dedication

With the greatest appreciation, I dedicate this work
to the *instructors involved in this study*.
They selflessly participated when others would not.

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Embarking upon a dissertation of this magnitude requires the help and dedication of a wide variety of people. I am forever indebted to the following individuals and organizations for their unending support and assistance:

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Chapter I

Purpose of the Study

Relevance to Urban Education

The formidable task of providing adult education in America is overflowing from traditional institutions into factories and the military. Business and military-based training and education, once considered wholly occupation specific, now constitute the largest adult training programs in the country. Employer-based basic skills instruction, management and executive education, technical and scientific preparation, and general education serve the gamut of vocationally impoverished youth and entry level workers, dislocated and retrained workers, and the elite management level career employee populations concentrated in our urban centers. Thus, adult education serves as a viable and valuable means to address urban social woes.

The soaring numbers of women and single parents in the workforce, a decline in the youthful-aged population, staggering unemployment, and accompanying occupational dislocation are profound indicators of the American urban environment. These allegories necessitate restructuring vocational, technical, and professional adult education to meet the special needs of the changing workforce and employment problems of selected populations. Employers are increasingly more concerned with employee job satisfaction, career development, and morale and are demanding far reaching changes in weary practices and long assumed constraints in the urban environment.

One plausible solution to these urban workforce problems is the use of alternative instructional delivery schedules to assist employee-students in balancing the demands and responsibilities of both family and work, while positively influencing quality of life through increased education and training. Workplace education has a significant role to play in solving

basic skill problems and meeting the needs of upgrading and updating the working force. To this end, the urban corporate sector can be a dramatic conduit for alternative training practices aimed at the problems of the occupationally at-risk and disadvantaged.

Corporations, industry, and the military can be considered large multicultural urban systems struggling to meet the needs of their communities. Their years of research and experience have led to the development of a vast assortment of instructional techniques and devices which have reduced the training of thousands of individuals to an efficacious utilitarianism. Additionally, the urban government and corporate sector have been a leading source of alternative employment schedules which contribute to quality of life. One of the more common flexible schedules presently used in the work environment, which could be adapted for use in an instructional environment, is the compressed week schedule. Similar adaptations of the study presented herein could be executed in both full-time industrial training programs and traditional higher education institutions.

Compressed Schedules in the Workplace

Much of the research on flexible work schedules suggests that, in many work situations, both the employer and the individual worker can benefit from alternative scheduling. While the compressed work week has some drawbacks, it is credited with improving employee motivation, reducing employee turnover and absenteeism, improving performance, improving employee attitude towards their job and the organization, attracting potential employees, and improving morale (Berkman, 1989; Jamieson & O'Mara, 1991). The objective of the compressed week is to help employees meet their personal and family obligations while maintaining their minimum number of work hours. Compressed week schedules are also attractive to some since they

increase the number of consecutive leisure hours and time available for other pursuits.

Palmer's (1990) assessment and the experimenter's own sampling (W. A. Gee, personal communication, August, 1991) of training policies and practices from selected Fortune 500 manufacturing and service companies, revealed that while all had tried or have in practice flexible work schedules, none had attempted to execute a compressed schedule for full-time training. The compressed week schedule's potential for use in a traditional academic instructional environment was explored by Stuckman (1981). His study demonstrated positive perceptual benefits for both students and faculty in a junior college system and found that the compressed format had no negative effect on student performance.

Workforce 2000

The phrase "Workforce 2000" is used by many to describe the increasing diversity of the American workforce (Jamieson & O'Mara, 1991; Johnston & Packer, 1987). Factors effecting both the national economy and employee training requirements include differences in age distribution, increasing gender equity, cultural multiformity, wide-ranging educational levels, inclusion of persons with disabilities, rising numbers of women, and shifting values in the new breed of American workers.

The workforce prior to the 1970s had a very different demographic and attitude profile. It was more homogeneous, with a large dominant majority and only a few visible minorities. The average member of the workforce was male, white, approximately 29 years old, and with fewer than 12 years of formal education. In terms of family values, the man of the family held the job and women generally worked in the home or in a few acceptable types of female-gender jobs (nursing, secretarial, teaching). Only certain types of jobs were open to ethnic

minorities. People worked hard to get ahead and saved for future goals (Jamieson & O'Mara, 1991).

Today, baby boomers, those born between 1946 and 1964, are the dominant force in our society. They constitute about one-third of the population of the United States and represent a bulging cohort in the middle of the workforce (Jamieson & O'Mara, 1991). Forecasters predict the core of the workforce for the next century will be middle-aged (35-54) and the number of youthful labor force entrants, those workers aged 16-24, will continue to decline (Jamieson & O'Mara, 1991; Levin & Schutza, 1983). As a result, organizations that relied on lower-paid, younger workers may need to redesign their jobs and work schedules.

Additionally, there is growing concern for the rising number of impoverished children and the potentially negative implications for a future skilled workforce and responsible citizenry. These dramatic changes in the workforce profile, a declining national economy, a perceived inability to compete in the global marketplace, and realigned family structure require that a high priority be placed on understanding the problems faced by workers. Creating greater choices for individuals with different needs and employing liberal human resource policies will undoubtedly be key in the years ahead.

The Evolution of Corporate Education

The industrial education system evolved in an effort to meet the demands of productivity, the training of workers, and the challenges of an interdependent global economy. This system is a valuable educational resource and should be seen as a vital contributor and purveyor of adult education, reaching beyond the conventional confines of classrooms and boardrooms. Why are American businesses choosing to develop their own expensive and extensive education system?

In short, corporations feel they are better able to accommodate rapidly changing knowledge and skill requirements by conducting their own programs. Worker education builds and maintains a strong, flexible, responsive, and effective workforce. Company-oriented education is equally vital to company effectiveness. In-house education improves cooperation and communication among employees by establishing collegial relationships. Additionally, recruitment and employee benefits are enhanced by educational opportunities since the notion of lifelong education has become a public and private goal and is firmly entrenched in the American way of life. The results translate into greater human capital for the businesses and the country.

The Military Education Network

Prior to the advent of the Department of Education in 1980 and its cabinet level authority, the Department of Defense (with its component organizations: the Navy, Air Force, Army, and Marine Corps), was more heavily involved in the educational process than any other department or agency of the government (Levine, 1982). Accordingly, the armed forces are still operating what is most likely the largest adult education program in the United States. Federally funded training activities constitute a large and significant portion of total military operations and administration. Few can appreciate the range and magnitude of these activities when measured in terms of people involved, time consumed, and dollars expended. Except in times of war, the military can be considered one huge training and educational enterprise.

The Department of the Navy's education and training network, much like the country's corporate education system and traditional academic architecture, makes a remarkable contribution to the world of American adult education. Historically, naval training consisted of only drills and maneuvers. Time spent in training was viewed as time away from ship's

activities. While this view may still persist to some degree, contemporary commanders recognize that experience is far too slow a teacher and that training in a variety of settings is the best path to a learned end. Naval training aims to provide not only technical knowledge and skills essential for specific operations, but also the technological understanding of the tasks at hand. Much of what is taught is applicable to civilian occupations. Previously, no relationship existed between military and civilian vocations, but technological advances have narrowed the gap considerably. Many a pilot, diesel mechanic, electronics technician, and radio repairman began their civilian careers with military training.

Military schools are not autonomous institutions relative to most civilian colleges and universities. Support services such as facilities, equipment, and operating expenses; manpower distribution; and selection of faculty, staff, and students are practically out of the school's control. Curriculum and instruction are geared to the immediate requirements of the service. High standards of teaching productivity and efficiency, modern equipment, well written texts and handbooks, and close supervision characterize naval education.

In further contrast to traditional education, Navy schools are generally short and intensive, produce a high student turnover, and thrive on uniformity. A standardized curriculum is employed almost without exception. Thus, all students are subjected to exactly the same unit of instruction, with no deviation according to previous training or experience. The premium is on form and procedure, rather than on individual or instructor, and there is constant pressure to economize on time and maximize the output. In short, successful military training can be defined as giving the largest number of people the greatest amount of technical skill and knowledge in the shortest amount of time.

Study Design and Environment

Educational researchers have had a harmonious relationship with military classrooms for some time. These "classrooms" are representative of those which are found in large urban industrial and corporate training facilities. The product of naval education also closely resembles adult education at the undergraduate, graduate, and post-graduate college levels. Therefore, the military education network serves as a sound platform for educational research and a legitimate experimental corollary for business and traditional urban education institutions.

This study was conducted with the cooperation of the United States Navy and coordinated through the Commander, Training Command, U.S. Atlantic Fleet (COMTRALANT). COMTRALANT staff further coordinated the use of selected courses at Fleet Training Center, Naval Station Norfolk, Norfolk, Virginia; Navy and Marine Corps Intelligence Training Center, Dam Neck Naval Station, Virginia Beach, Virginia; Fleet Combat Training Center, Atlantic, Dam Neck Naval Station, Virginia Beach, Virginia; and the United States Marine Corps Base, Camp Lejeune, Lejeune, North Carolina. Instructor and course selections were made with the assistance of COMTRALANT personnel. The use of military resources allowed the study to be conducted in a fully operational educational environment.

This study was designed to explore the opportunity to transform adult education using alternative instructional delivery techniques taken from the workplace and applying the knowledge of adult learning, motivation, and performance. The paucity of data in this area lends itself to research which could influence the development of a massive jobs training and education strategy for urban areas with sizable concentrated unemployment and occupationally

dislocated populations. It was also intended to look at the effect that altering the instructional delivery schedule would have on student achievement and knowledge retention. The design presented herein hoped to elicit meaningful data to gain a greater understanding of this potential.

A quasi-experimental (intact/static group comparison) design (Campbell & Stanley, 1966) with two treatment groups was adopted for this study. Treatment Group 1 received instruction delivered during a conventional five-day training week and Treatment Group 2 had instruction delivered via the experimentally compressed four-day training week. Both groups were blind to the rationale of the study. The study examined two courses which employed four class convenings (i.e., two conventional week and two experimental week sessions) and two courses which employed six class convenings (i.e., three conventional week and three experimental week sessions). The same instructor(s) were to conduct all repetitions of the conventional weeks followed by all of the experimental weeks for their respective courses. New students were expected in each of the class sessions and all subjects were both students and employees of the Department of Defense. The experimental environment was intended to be similar to those of the corporate and conventional education systems, thus, findings would be applicable to other urban adult education settings.

Chapter II

Literature Review

Introduction

Workplace competency in high performance industries requires the ability to manage resources, work amicably and productively with others, acquire and use information, understand and master complex systems, and work comfortably with a variety of technologies. The changing economic climate and an uncertain working environment lead to a debate of whether the preparation of the work force should take place in schools or the work place. The education system in this country may not alone be adequate to play its expected role in assuring individual opportunity, promoting growth and prosperity in the economy as a whole, and strengthening the country's ability to compete in a global market. The central points of the Education Reform Movement of the 1980s, in response to reports such as A Nation at Risk (1983), Action for Excellence (1983), Educating Americans for the 21st Century (1983), High School: A Report on Secondary Education in America (Boyer, 1983), and A Time For Results: The Governors' Report on Education (1986), condemned the conditions of public schools and the decline in student achievement while asserting that there would be fewer jobs for individuals with lower levels of educational attainment.

The Labor Secretary's Commission on Achieving Necessary Skills report (1992) claimed that a high school diploma had become a ticket to underemployment or unemployment. The federal commission concluded that local educators and businesses must focus on reinventing education and encouraging work-based learning. Generic skills are not the answer and many skills can only be learned on the job or in corporate classrooms.

The focus of this study is on the use and effectiveness of compressed schedules in instructional delivery. It is, therefore, reasonable and necessary to establish a framework of the changing workforce requirements, the corporate classroom, and the military classroom in a larger context. Furthermore, a presentation of the foundation of various studies in massed versus distributed practice and their implications for restructuring adult education and training will also be reviewed.

Alternative Flexible Schedules

The standard work week (40 hours, five days) is the most prevalent statistical pattern of employment, although various alternative schedules are being used. Alternative work schedules for permanent full-time employees are frequently advocated as a solution to problems faced by the growing numbers of single-parent families, working mothers, students, and others wishing to upgrade skills or switch careers in the workforce (Hewlett, Ilchman, & Sweeney, 1986; Staines, 1989). Many employers also feel the need to serve the public outside the traditional workday and offer a low cost alternative for helping people integrate both work and family responsibilities. Additionally, alternative schedules are attractive to some workers by increasing the number of continuous leisure hours and time available for other pursuits.

The number of alternative schedules in the workplace continue to increase steadily according to the Bureau of National Affairs (1988). The most popular alternate schedules for permanent full-time employees are flextime and the compressed work week. Flextime is a work pattern that allows employees to vary their arrival and/or departure times. A compressed work schedule is one that enables a full-time employee to work the equivalent of a full week in less than five full days (Women's Bureau, 1980). Typically, this is accomplished

in four days of ten hours each day. Compressed work weeks, although relatively rare in comparison to flextime, have been growing at an accelerated rate (Smith, 1986).

Evaluations of flexible work schedules have tended to focus narrowly on the effects of the level of flexibility permitted in the schedule and these studies have been criticized for flaws in their design (Folkard & Monk, 1985; Golembiewski & Proehl, 1978; Nollen & Martin, 1978; Ronen, 1984). However, an extensive body of research on flexible schedules suggests that, in many work situations, both the employer and the individual worker can benefit from alternative schedules. Ivancevich's (1974) analysis of the compressed week indicated that workers in the four-day week were more satisfied with personal worth, social affiliation, job security, and pay; experienced less stress; and performed better than their five-day counterparts. The literature would further suggest that firms had adopted the four-day work week because of potential organizational improvements in production and morale (Dickinson & Wijting, 1975; Wheeler, Gurman, & Tarnowieski, 1972), organizational effectiveness (Dunham, Pierce, & Castaneda, 1987), reductions in absentee rates (Steward & Larsen, 1971), improved performance (Hall & Nougaim, 1968; Nollen, 1979; Poor, 1973), reductions in overtime pay and operating expenses (Ronen & Primps, 1980), and the convenience that it afforded employees by providing an extra day off (Allen & Hawes, 1979; Mahoney, 1978; Poor, 1973). Most public employees favored a Monday or Friday as the extra day off in a compressed four-day work week (Kenny, 1974). While offering promise, the evidence on compressed week implementation is far from definitive.

Alternative schedules are firmly entrenched in the workplace, but are less visible on the educational landscape. Palmer's (1990) assessment and the experimenter's own sampling (W. A. Gee, personal communication, August, 1991) of Fortune 500 manufacturing and service

companies discovered that none had attempted to execute a compressed schedule for full-time training sessions. Thus, the concept of extending the school day to shorten the week to four days in lieu of holding classes a fifth day offers an opportunity for meaningful study.

The four-day operational week was implemented in a junior college system and studied by Stuckman (1981). His evaluation concluded that the compressed week of concentrated instruction had no negative effect on student performance, caused no problems for the majority of the students, and nearly all students and faculty preferred and recommended the four-day class week for full implementation. Many primary and secondary public schools also see the four-day week, with its lengthened school day, as a change for the better. Richburg and Edelen (1981) found that parents, teachers, and students all favored the four-day week over the five-day week by a wide margin. The schools also achieved substantial cost savings in gasoline consumption and maintenance costs for buses, electrical consumption, and substitute teacher costs (i.e., reduced teacher absenteeism) (Bauman, 1983). The Utah State Board of Education's (1989) findings summarized that their schools with extended days did show improved test score gains (though not significant) and the majority of teachers favored the schedule.

The underlying strategy of the compressed work/school week is to shorten the week to four days by increasing the length of the work/school shift to 10 hours. The presumed advantage is that the employee-student now has more non-work/school days per week, thereby gaining larger blocks of time for study and leisure. The potential risk, on the other hand, is that the additional two hours per shift may result in fatigue-induced decrements in performance (Goodale & Aagaard, 1975; Hedges, 1971; Ivancevich, 1974; Ivancevich & Lyon, 1977; Levin, 1984; Poor, 1973). A review of the literature on compressed weeks revealed persistent concerns about feelings of increased fatigue associated with longer days despite employee's

overall satisfaction with the compressed week (Dunham & Hawk, 1977; Ivancevich, 1974; Latack & Foster, 1985; Newstrom & Pierce, 1979; Wilson & Byham, 1972), and their willingness to tolerate or adapt to increased subjective fatigue (Poor, 1973; Rosa & Colligan, 1988). In contrast, Breugh (1983) and Latack and Foster (1985) provided empirical evidence that fatigue was not a problem in participation in a compressed work schedule.

Clearly the compressed work week is not appropriate for all settings under all conditions (Glueck, 1979; Nollen, 1981; Poor, 1973; Ronen & Primps, 1981). Yet, on the basis of the available evidence, there is no reason to suspect that going to school more hours in four days, instead of five days of traditional length, hinders student achievement.

Massed Versus Distributed Training

There is a litany of concern for the psychological considerations of learning in a compressed mode which must be weighed. Bruner, Goodnow, and Austin (1956) and Smith and Hudgins (1965) cautioned that the relationship of time to learning is a complex one involving a number of variables. The literature generally takes a negative view toward the proposition that extending the school day will, by itself, bring about improved learning (Blai, 1986; Walberg, 1988).

To summarize findings from other research, an inconclusive relationship between time and student achievement as a result of the intensity of the training experience was found. Bouzid and Crawshaw (1987), Hossler (1988), Jensen and Freund (1981), and Rea and Modigliani (1985) concluded that expanded practice is significantly superior to massed practice in a classroom situation. At the other end of the spectrum, Berah (1981), Dempster (1987), and Shuell (1981) suggest that there is no significant difference in interval training results.

Merrill and Yaryan (1968) studied the effect of massed versus distributed television training in adults and their data indicate that both treatments supported learning, yet there was no significant difference in achievement between the two groups. However, their results demonstrated significant morale benefits for massed training subjects.

The Changing American Workforce

Television and other media have prompted a massive information explosion and more people are returning to school for continuing education courses. Never before have so many college graduates been in the workforce (Eurich, 1985). However, the number of less educated people in the workplace is also increasing, as is the number of people who are considered functionally illiterate (Jamieson & O'Mara, 1991). The less educated workforce will struggle to find matches with jobs requiring ever-increasing skill levels, while they compete with an influx of non-traditional workers for the remaining low-skilled, entry-level jobs.

Changes in technology and the market, along with challenges from other industrialized nations, have cast criticism on the American work ethic and technological ability. Also, these changes have arguably prompted a shift in our occupational structure towards higher skilled jobs and the elimination of lower level jobs. The skill and educational implications of this transformation and associated new technology continue to generate controversy. Proponents of the deskilling hypothesis (Braveman, 1974; Levin, 1987) argue that technology is used to reduce the skills needed by workers. Additionally, Berg (1970), Freeman (1976), and Rumberger (1981) warned that many Americans were acquiring more education than they would need for future jobs. Attacking the deskilling notion, the Department of Labor determined there would be faster growth of those occupations held by more skilled workers than those with

incumbents who have relatively little education (Johnston & Packer, 1987). Adler (1986), Bailey (1990), and Hirschorn (1988) further espoused that rather than deskilling jobs, technological advances would demand more conceptual and problem solving abilities. One desirable output of education is the ability to cope with change. Thus, if educated workers are better able to respond to change and uncertainty and if uncertainty is growing, then the relative demand for educated workers should also grow.

The Corporate Classroom

The training of employees has not been historically considered part of the nation's traditional education system. Yet, the training of workers for specific jobs or positions within organizations has been practiced for many years and more recently job force skills are considered among the prime criteria for rating the success of the schools. Formal in-plant education has long since replaced experience acquired through apprenticeships. Some corporate giants, such as General Motors, even own and operate fully accredited undergraduate colleges for their employees (Morse, 1984).

Mass production, introduced into factories in the early 1900s, required workers who were trained to be cooperative and possess specific skills to operate machinery. To produce these kinds of workers, American corporations turned away from traditional education programs and began to create their own industrial training programs (Levine, 1982; Moore, 1982). By the 1930s, corporate programs had become recognized as one of the largest educational sectors in the country. By the 1950s, industry was demanding more training in management and supervision as a means to become more competitive in the market place. Today's training programs are extremely sophisticated and comprehensive (Moore, 1982).

Businesses are eager to spend an estimated 250-350 billion dollars a year (Palmer, 1990; American Society for Training and Development, 1991) to provide a wide range of training and education to develop a more skilled workforce. In addition, corporations are providing an increasing amount of instruction in basic skills to employees at all levels as the increasing importance of human capital is recognized (Becker, 1975; Mincer, 1970; Palmer, 1990; Schultz, 1981).

Workplace learning is recognized as a major contributor to growth in productivity as industry has never been able to rely on the traditional system with its different goals and styles (Palmer, 1990). Estimates are that from 60 to 80 percent of corporate education and training is provided in-house (Eurich, 1985). Glover and Grubb (1983) acknowledge firm-based training provided skills that external programs could not provide with resultant advantages in recruitment, screening, retention, and placement.

Dillard and Tan (1986) studied training after high school in the United States and suggested that the employer was the single most important source of training. Their data further support, not surprisingly, that completion of training programs to improve basic job skills has a positive effect on earnings, earning growth, and employment stability, particularly for economically disadvantaged young men, mature men, and women.

Specialized jobs, changing technology, foreign and domestic competition, and movement from the industrial to the information age prompt a need for additional, almost continual learning. Private firms will continue to educate a large portion of the adult market for the workplace as the dynamic economic climate makes skill acquisition of the workforce all the more important.

The Navy Classroom

The United States Navy currently employs nearly 560,000 active duty personnel to meet its military mission and provide for national security (Department of Defense [DOD], 1992). Forces are deployed overseas and around the United States, with concentrations on the Atlantic and Pacific coasts. Every day of the year, 40 to 60 percent of the personnel constituting the active duty forces of the Navy are participating in formal classes in some school or in individual or unit training (Clark and Sloan, 1964; DOD, 1992). Fourteen percent of the Navy's annual operating budget of over 267 billion dollars is spent on training and education for its personnel (DOD, 1992).

The primary objective of education in the Navy is to train sailors and officers for sea combat duty. The increasing complexity of weaponry and platforms (ships, submarines, and aircraft) brought on by scientific and technological advances, is staggering. Accordingly, weapons in the inventory must have corresponding new training and instruction programs of increasing length and sophistication to support them.

Signal and radio schools were the Navy's first formal training programs established at Great Lakes Naval Training Station, Illinois, when that installation was authorized in 1904. By 1923, Naval Training Station, San Diego, California, was commissioned to supplement the instruction at Great Lakes. Marked expansion of Navy shore schools did not occur until just prior to World War II. Currently, the Navy operates nearly 500 technical schools (W. A. Gee, personal communication, December, 1992).

There is a formidable task in training new accessions and the continuous retraining of career naval forces. Much of the attention is devoted to training large numbers of personnel

who remain in the service for a relatively short period of time. In time of national emergency, training becomes a primary occupation of the military because of the tremendous increases in the numbers of people that require training. Teaching is conserved and educational productivity is stepped up. The military must be trained quickly to be ready for tasks they may never be called upon to perform and must maintain a high degree of readiness over long periods.

The educational structure of the Navy is more complex than other services. To maximize productive time of the new enlistee, the Navy tends to fragment technical specialties to shorten course length in entry level training. Navy school instruction is generally concentrated on one subject and a full day usually consists of six to eight hours in the classroom, lab, or trainer. Instructors are skilled senior enlisted personnel, civilians, or officers. Upon graduation, students are sent to units for additional on-the-job training and can apply the knowledge and skills recently acquired.

The development and proliferation of education in the armed forces closely parallels growth in scientific research and technological advances. As a result, there has been a corresponding reduction in the number of purely military or combat occupational specialties. The majority of today's service people are employed in electrical and mechanical equipment repair, administration, and communications. The Navy, much like the corporate sector, has demonstrated very little need for the unskilled and uneducated and they are no longer enlisting non-high school graduates (DOD, 1992).

Conclusions

Today, more education is required than can be acquired casually on the job. Continuous education is necessary to keep abreast of the rapid changes in technology in the workplace. The

importance of the corporate and military classroom has been validated while training programs continue to reflect traditional work patterns. The success of flexible work schedules suggests consideration for its implementation in the training environment. Clearly, business, military, and other urban adult educators can be influenced by these findings. Whether the compressed week is a valuable alternative format for instructional delivery is an area largely unexplored. This study provides one example of the use of a compressed week for training. Findings from this study can suggest important questions to examine as we continue to explore a variety of training patterns for urban industry and the military.

Chapter III

Methodology

Research Questions

The following research questions are presented for testing:

1. Will there be a difference in immediate retention for those students who have completed a course in four days as compared to those who have completed the same course in five days?

2. Will there be a difference in delayed retention effect for those students who have completed a course in four days as compared to those who have completed the same course in five days?

Ancillary Research Question

1. What benefits (perceived or real) will be derived from an alternative delivery schedule?

Variables

The independent variable in this study was the training week schedule and was comprised of two treatment conditions. The first was the conventional training week and the second was the compressed training week. Operationally, the conventional week is defined as five consecutive days of training for eight hours per day for a total of 40 hours. The compressed week is defined as four consecutive days of training at 10 hours per day for a total of 40 hours.

The dependent variable of this study was a measurement of student achievement. Level one, immediate retention (IR), was measured by a standardized written examination that was completed as the last activity of the training week for each course involved in the study. Level two, delayed retention effect (DRE), was measured by a shorter equivalent version of the exit examination and administered approximately six weeks following course completion.

Biographical collateral data were collected from each student to follow Helmstadter's (1964) data snooping paradigm.

Experimental Environment

This study was conducted with the cooperation of the United States Navy and coordinated through the Commander, Training Command, U.S. Atlantic Fleet (COMTRALANT). See Appendix A for a copy of the letter of support. COMTRALANT staff selected instructors and courses at Fleet Training Center, Naval Station Norfolk, Norfolk, Virginia; Navy and Marine Corps Intelligence Training Center, Dam Neck Naval Station, Virginia Beach, Virginia; Fleet Combat Training Center, Atlantic, Dam Neck Naval Station, Virginia Beach, Virginia; and United States Marine Corps Base, Camp Lejeune, Lejeune, North Carolina, to be included in this study. The use of military resources allowed the study to be conducted in a fully operational educational environment.

Research Design

A quasi-experimental (intact/static group comparison) design (Campbell & Stanley, 1966) with two treatment groups was adopted for this study. Treatment Group 1 received instruction delivered during a conventional training week and Treatment Group 2 received

instruction delivered via the experimentally compressed week. Both groups were blind to the rationale of the study. The study included four courses, two with two conventional week and two experimental week sessions, and two with three conventional week and three experimental week sessions. The same instructor(s) conducted all repetitions of the conventional weeks and all of the experimental weeks for their respective courses. Different students participated in each of the class sessions. A course and treatment matrix is provided as Table 3.1.

Table 3.1
Course/Treatment Group Matrix

<u>Course Title</u>	<u>Course Week</u>					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
ADV COMM	1*	1	1	2**	2	2
CSA	1	1	2	2	-	-
HWATCH	1	1	2	2	-	-
SCI ADM	1	1	2	2	1	2

* TREATMENT GROUP 1: Conventional Five-Day Week

** TREATMENT GROUP 2: Experimental Four-Day Week

Immediate retention (IR) observations for both treatment groups consisted of the same written examination for each respective course, which was completed at the conclusion of the training week. The standardized examinations explored the course content mastery of each student and were administered, scored, and recorded by the course instructor. Delayed retention effect (DRE) observations consisted of a shorter, yet equivalent version of the

aforementioned standardized exit tests. These exams were given to a sampling from each treatment group, as discussed below, and were administered by Training Officers of the military unit to which the subjects were attached. The completed exams were forwarded to the experimenter for scoring and recording.

Sampling Procedures

1. Courses. The target sample consisted of selected five-day training courses in the Navy training catalogue under the cognizant authority of either the Commander, Training Command, U.S. Atlantic Fleet (COMTRALANT) or the Commander, Training Command, U.S. Pacific Fleet (COMTRAPAC) and conducted in the vicinity of Tidewater Virginia. Further selection variables included: (a) the course must consist of 40 hours of instruction and currently delivered in five consecutive training days, (b) of the 40 hours of instruction, at least 80% was to be comprised of lecture-oriented delivery, and (c) the primary course instructor(s) was to be available to teach each of the course convenings employed in the study. That is to say, any instructor(s) expecting to transfer from their tour during the course of the study was eliminated from selection. Based on these variables, four courses were selected for study. These included Advanced Communications Procedures (ADV COMM), Combat Systems Alignment Theory (CSA), Harpoon Watch Officer (HWATCH), and Sensitive Compartmented Information Administration and Physical Security (SCI ADM). Discussion of course content is presented in Appendix B.

2. Subjects. Subject assignment to treatment groups was made on the basis of the course session in which they enrolled. Students ordinarily enroll in a course convening which meets their individual and unit needs. The Navy did not advertise that experimental sessions

would afford a different schedule from any other convenings in an effort not to influence those enrollments. Each course is assigned a quota by the course manager and enrollment is usually on a first-come basis.

More than 50% of the graduates from each treatment group were selected to complete the delayed retention examination. A return rate of over 50% was anticipated based upon historical response data from COMTRALANT (W. A. Gee, personal communication, December, 1991).

Subject Population

Student subjects involved in this study were U.S. Navy and Marine Corps active duty and reserve personnel and Department of Defense civilian employees, assigned to these courses by their employer commands. Three hundred and ten (310) subjects participated in this study. The ten civilian subjects were merged into the officer and enlisted populations based upon their protocol equivalent. Junior civilians, those in pay grades GS-6 and below, were designated enlisted equivalents. Senior civilians, those in paygrades GS-7 and above, were designated officer equivalents. Student population demographics and course/treatment matrices are presented in Tables 3.2 through 3.4.

Table 3.2

Student Subject PopulationStudent Population N = 310Rank/Paygrade

Enlisted & Civilians (GS-6 and below)	230
Officers & Civilians (GS-7 and above)	80

Gender

Male	252
Female	58

Table 3.3

Student Population Demographics/Course Matrix

<u>Course</u>	<u>Enlisted</u>	<u>Officers</u>	<u>Male</u>	<u>Female</u>
ADV COMM	116	0	94	22
CSA	37	0	37	0
HWATCH	7	28	35	0
SCI ADM	70	52	86	36

Table 3.4

Student Population/Treatment MatrixTREATMENT GROUP 1: CONVENTIONAL FIVE-DAY WEEK

<u>Course</u>	<u>Enlisted</u>	<u>Officers</u>	<u>Male</u>	<u>Female</u>
ADV/COMM	57	0	50	7
CSA	19	0	19	0
HWATCH	3	16	19	0
SCI ADMIN	36	26	41	21

TREATMENT GROUP 2: EXPERIMENTAL FOUR-DAY WEEK

<u>Course</u>	<u>Enlisted</u>	<u>Officers</u>	<u>Male</u>	<u>Female</u>
ADV COMM	59	0	44	15
CSA	18	0	18	0
HWATCH	4	12	16	0
SCI ADMIN	34	26	45	15

InstrumentationStudent Achievement

Two instruments were used to measure student achievement. These included a final examination (IR) and a delayed post test (DRE).

1. Final Examinations. The final examinations were standardized multiple choice written exams used in current naval training configurations and were a requirement for course completion. The exams were developed by naval technical training personnel, validated through established Navy procedures, and used in both the traditional and the experimental courses. The exams were administered at the conclusion of each course session. Each of the final examinations were evaluated for face and content validity by individual field experts. Validity was established using Navy procedures by a population of over 40 reviewers. Final exam instruments are not available for inclusion in this dissertation because of their continued use and risk of compromise.

2. Delayed Post Tests. The delayed post tests were prepared exclusively for this study by course instructors to measure course content retention and consisted of substantially shorter versions of the final exams. These tests are not ordinarily used as part of the course evaluation by the Navy but were administered to a sampling of subjects from both the traditional and the experimental courses. The tests were administered approximately six weeks after course completion. The delayed post tests were evaluated for face and content validity by individual field experts. Validity was established using Navy procedures by five reviewers for each different test.

The delayed post test cover sheet was viewed as the main source of information that selected subjects would refer to in deciding whether or not to complete and return the test to the experimenter. To attempt to positively influence the response rate, many of Borg and Gall's (1989) suggestions were employed. These included: organizing the layout of the instructions for easy reading and attractiveness, numbering the test questions, including brief and clear instructions for completing the test, and including enough information regarding the purpose of

the study and use of the results so that the test would become meaningful to the respondent. A sample delayed post test instrument is available for review and is presented as Appendix C.

Letters of Transmittal

According to Borg and Gall, perhaps the single most important factor in determining the percentage of responses obtained is the letter of transmittal used to forward the follow-up examination to selected students. They recommend that the letter be brief, yet convey the necessary information to give the Training Officers and student subjects good reason to complete the examination and send it back to the experimenter. Many other recommendations were implemented in an attempt to increase the response rate. Among these, placing the name and address of the person (experimenter) to whom the forms should be returned on the correspondence; including brief and clear instructions, conveying that the completed exam be returned as early as possible; briefly explaining the purpose of the study to make the contribution seem meaningful; and including a self-addressed, stamped envelope so the Training Officers could respond with a minimum of inconvenience and at no cost. First-class, hand-stamped envelopes with large, colorful stamps were utilized in preference to postal-permit envelopes. The letters were also individually signed with a different color (blue) ink than the print of the letter (black) attempting to command attention. This may have been a distinct factor in this study since black ink is almost exclusively required when preparing official naval correspondence. Lastly, professional affiliation was exploited in an appeal for response since it was mentioned that the study was conducted under the auspices of a recognized professional institution, intended to represent an authority symbol to respondents. A sample letter of transmittal is presented as Appendix D.

Data Collection

Descriptive/Demographic Data

Descriptive/demographic data were collected from every student subject involved in the study for tentative exploration. Data (such as pay grade, years in service, current military unit address, career intentions, years of organized schooling, number of dependents living at the member's home, etc.) were collected on the first morning of each course convening. A sample of the descriptive/demographic information request form is presented as Appendix E.

Student Achievement

Immediate retention data (final exam scores) were collected as the last activity of each course convening. Exams were scored and recorded by the instructor and the summaries forwarded to the experimenter for analysis. Delayed retention data (delayed post test scores) were solicited by mail, by the experimenter in advance of the sixth week following course graduation. Completed post tests were returned to the experimenter for scoring, recording, and analysis. There were no attempts to collect data from non-respondents of the original requests as the variability of response times would confound analysis.

Internal and External Validity Controls

The question of internal validity was raised by the differential selection of subjects. Since the design did not pre-test or match subjects, some measure of confounding was anticipated since the experimenter could not assess whether the two treatment groups were essentially equivalent. The experimenter presupposed that the magnitude of the sample size

would tend to mitigate confounding characteristics and allow the data to be statistically analyzed (Kerlinger, 1973). External validity was enhanced by limiting selected courses to those adult training classes using primarily lecture-oriented teaching methods.

Chapter IV

Presentation and Analysis of Data

Introduction

Two categories of data were collected. These included student achievement and student descriptive/demographic data collected from every student at each course session. Data categories and measurement instruments used were:

1. Student Achievement
 - a. Final Examinations
 - b. Delayed Post Tests
2. Student Descriptive/Demographics
Questionnaire

Significance was reported at various levels. These levels were calculated and reported to a minimum of three digits.

Student Achievement

Two instruments were used to measure student achievement. These included final examinations used to assess immediate retention (IR) and delayed post tests used to assess the delayed retention effect (DRE).

1. Final Examinations. Final examination scores were collected from every student in the study population. Scores were based on a maximum of 100 points. These data were analyzed using two-tailed t test and separate variance estimate statistical packages. Data were analyzed by course and treatment group. The results are shown at Table 4.1 and reveal that

there was no statistical significance ($p < .05$). Significance would be established at the levels indicated.

Table 4.1
Final Examination Score Analysis By Course
and Treatment Group
(t test)

<u>Course</u>	<u>n</u>	<u>Group 1</u>	<u>n</u>	<u>Group 2</u>	<u>t-value</u>	<u>p</u>
ADV COMM	57	85.544	59	85.237	.25	.804
CSA	19	94.368	18	93.444	.54	.590
HWATCH	19	91.263	16	90.812	.31	.761
SCI ADMIN	62	94.032	60	92.317	1.59	.115

2. Delayed Post Tests. Delayed post test data were solicited from more than half of the study population using sampling criteria previously described. Scores were based on a maximum of 100 points. These data were analyzed using two-tailed t test and separate variance estimate statistical packages. Data were analyzed by course and treatment group. The results are shown at Table 4.2 and reveal that there was no statistical significance ($p < .05$). Significance would be established at the levels indicated.

Table 4.2
Delayed Post Test Score Analysis By Course
and Treatment Group
(t test)

<u>Course</u>	<u>n</u>	<u>Group 1</u>	<u>n</u>	<u>Group 2</u>	<u>t-value</u>	<u>p</u>
ADV COMM	36	58.944	29	57.276	.45	.655
CSA	11	73.364	14	71.857	.20	.846
HWATCH	14	75.071	11	76.546	-.29	.775
SCI ADMIN	33	85.303	30	87.767	-.84	.406

Delayed post test response matrix data are presented at Table 4.3 and reveal a more than 80% respondent rate.

Table 4.3
Delayed Post Test Response Matrix
(Frequencies and Percentages)

TREATMENT GROUP 1

<u>Course</u>	<u>Requested</u>	<u>Received</u>	<u>%</u>
ADV COMM	42	36	85.714
CSA	11	9	81.818
HWATCH	17	14	82.353
SCI ADMIN	39	33	84.615

TREATMENT GROUP 2

<u>Course</u>	<u>Requested</u>	<u>Received</u>	<u>%</u>
ADV COMM	37	29	78.378
CSA	15	14	93.333
HWATCH	14	11	78.571
SCI ADMIN	39	32	82.051

SUMMARY

<u>Total</u>	<u>Requested</u>	<u>Received</u>	<u>%</u>
N	214	178	83.178

3. Paired Sample Comparison. The data collected from the subjects responding to the delayed post test sampling are paired with their final examination data in Table 4.4. Both scores were based on a maximum of 100 points each. The data were analyzed using a two-tailed t test and revealed a significant difference for many course sessions, from both treatment levels.

Table 4.4
Paired Final Exam and Delayed Post Test Score
Analysis By Course Session
(t test)

<u>Course</u>	<u>n</u>	<u>Score 1</u>	<u>Score 2</u>	<u>t-value</u>	<u>p</u>
ADV COMM 1	12	81.750	52.250	8.93	.000
ADV COMM 2	14	86.071	61.000	7.75	.000
ADV COMM 3	10	87.300	64.100	4.19	.002
ADV COMM 4*	9	81.778	63.000	5.22	.001
ADV COMM 5*	10	88.400	55.300	7.41	.000
ADV COMM 6*	10	88.100	54.100	6.91	.000
CSA 1	4	94.000	66.750	5.52	.012
CSA 2	7	94.571	77.143	2.60	.041
CSA 3*	7	94.571	78.286	2.75	.033
CSA 4*	7	93.429	65.429	3.48	.013
HWATCH 1	6	92.333	74.500	6.54	.001
HWATCH 2	8	91.000	75.500	4.59	.003
HWATCH 3*	6	91.667	75.167	2.61	.047
HWATCH 4*	5	89.600	78.200	1.65	.175**
SCI 1	14	96.000	88.714	3.06	.009
SCI 2	10	92.800	82.600	2.12	.063**

Table 4.4 continued

<u>Course</u>	<u>n</u>	<u>Score 1</u>	<u>Score 2</u>	<u>t-value</u>	<u>p</u>
SCI 3*	4	91.500	87.750	.84	.461**
SCI 4*	14	92.286	89.214	1.17	.265**
SCI 5	9	92.222	83.000	2.93	.019
SCI 6*	12	90.500	86.083	2.74	.019

* Experimental Treatment Group

** Not statistically significant at the .05 level

Score 1. Final Examination Score

Score 2. Delayed Post Test Score

Student Descriptive/Demographic Data

Descriptive/demographic data were collected from every subject involved in the study. The student's age, time in service, and years of formal schooling (12 years is the operational equivalent of a high school diploma) were submitted to descriptive statistical packages and the results are presented at Table 4.5.

Table 4.5

Student Descriptive Information
(Means and Standard Deviations)

<u>Variable</u>	<u>x</u>	<u>SD</u>
Age	28.032 years	6.452
Time in Service	7.254 years	5.273
Years of Schooling	13.458 years	1.968

Additionally, gender, paygrade, and age demographic data frequencies and study population percentages are presented at Table 4.6.

Table 4.6
Student Demographic Data
(Frequencies and Percentages)

<u>Variable</u>	<u>n</u>	<u>%</u>
<u>GENDER</u>		
Male	252	81.290
Female	58	18.710
<u>GRADE</u>		
Enlisted	230	74.194
Officer	80	25.806
<u>PAYGRADE</u>		
Enlisted		
E3	7	2.258
E4	82	26.452
E5	81	26.129
E6	33	10.645
E7	17	5.484
E8	3	0.968
E9	3	0.968
GS4	2	0.645
GS5	2	0.645

Table 4.6 continued

<u>Variable</u>	<u>n</u>	<u>%</u>
Officer		
CWO2	2	0.645
CWO3	1	0.323
O1	19	6.129
O2	15	4.839
O3	24	7.742
O4	7	2.258
O5	5	1.613
O6	1	0.323
GS7	3	0.968
GS9	2	0.645
GS10	1	0.323
<u>AGE</u>		
18-20	28	9.032
21-25	103	33.226
26-30	87	28.065
31-35	50	16.129
36-40	29	9.355
Over 40	13	4.194

Additional Findings

Table 4.7 presents delayed post test scores with a one-way analysis of variance to determine any interaction between elapsed times (i.e., the number of days between final

examination and post test). Elapsed time was operationally grouped as: (a) one month -- 33 days or less, (b) two months -- 34 to 60 days, and (c) more than two months -- 61 days or more. A statistically significant interaction ($p < .05$) was found to exist between post test scores and elapsed times. Specifically, those students who completed the delayed post test within one month (33 days or less) of the final examination scored significantly higher than those who completed the post test more than two months (61 days or more) later.

Table 4.7
Delayed Post Test Score By Number of Days
Between Final Exam and Post Test
(Analysis of Variance)

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Groups	2	2488.819	1244.410	3.706*
Within Groups	175	58759.928	335.771	($p < .0265$)
Total	177	61248.747		

* Statistically significant at the .05 level.

Table 4.8 presents delayed post test scores from Treatment Group 1 (traditional) with a one-way analysis of variance to determine any interaction between elapsed times. A statistically significant interaction ($p < .05$) was found to exist within the group's post test scores and between elapsed times. Specifically, those students completing the post test within two months (34 to 60 days) of the final examination scored significantly higher on the delayed post test than did those completing the post test more than two months (61 days or more) from the final examination. Also, those students completing the post test within one month (33 days or less) of the final examination scored significantly higher on the delayed post test than all other Treatment Group 1 subjects.

Table 4.8
Treatment Group 1 Delayed Post Test Score By Number
of Days Between Final Exam and Post Test
(Analysis of Variance)

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Groups	2	7996.150	3998.075	16.513*
Within Groups	91	22033.095	242.122	
Total	93	30029.245		

* $p < .000$

Table 4.9 presents Treatment Group 2 (experimental) delayed post test scores with a one-way analysis of variance to determine any interaction between elapsed times. No statistical interaction ($p < .05$) was found within the experimental group based on elapsed times between final examination and the delayed post test.

Table 4.9
Treatment Group 2 Delayed Post Test Score By Number
of Days Between Final Exam and Post Test
(Analysis of Variance)

<u>Source</u>	<u>df</u>	<u>SS</u>	<u>MS</u>	<u>F</u>
Between Groups	2	2145.324	1072.662	2.992*
Within Groups	81	29043.485	358.562	($p < .0558$)
Total	83	31188.809		

* Not statistically significant at the .05 level.

Chapter V

Conclusions and Recommendations

Student Achievement

Two instruments were used to measure student achievement. These were the final examination used to assess immediate retention and the delayed post test used to assess the delayed retention effect.

1. Final Examination. Final examination data were submitted to t test and analysis revealed no statistical significance ($p < .05$) between the treatment groups in any of the courses involved in this study. This finding is particularly noteworthy since the four courses involved require widely different content mastery, as described in Appendix B.

From this, it is concluded that:

- a. The two treatment groups were essentially the same.
- b. The four-day week of concentrated instruction did not negatively impact on student achievement, thus, affording empirical evidenciary support to its further integration in the academic arena.

2. Delayed Post Test. Delayed post test data were submitted to t test and analysis revealed no statistical difference ($p < .05$) between the treatment groups in any of the courses involved in this study. From this, it is concluded that the four-day week of concentrated instruction is not damaging to knowledge retention.

3. Paired Final Examination and Delayed Post Test Scores. Final examination score data were subjected to t test and analysis with the paired sampling of delayed post test respondent

data. The findings revealed statistically significant differences (at various levels) in all (16) but four classes (three experimental and one traditional). From this, it is concluded that, in general, students had significantly greater content mastery at the conclusion of the course than they did after time had elapsed, regardless of the treatment mode. This is consistent with the literature.

Student Descriptive/Demographic Data

The student's age, time in service, and years of formal schooling were submitted to descriptive statistical analysis. Results reveal a fairly wide student demographic population. From this, it is concluded that the variation in study population demographics lends itself to favorable external validity generalizations to other urban target populations.

Additional Findings

Delayed post test scores were submitted to a one-way analysis of variance to determine any interaction between elapsed times (i.e., the number of days between final examination and the post test). Analyses of variance were also conducted on Treatment Group 1 (traditional) and Treatment Group 2 (experimental) delayed post test scores, respectively. The findings revealed a statistically significant interaction ($p < .05$) within the entire population of post test scores and between elapsed times, and Treatment Group 1 post test scores and elapsed times. There was no statistical interaction ($p < .05$) found within Treatment Group 2 post test scores and between elapsed times. From this, it is concluded:

- a. In general, students who completed the delayed post test within one month (33 days) of the final examination scored significantly higher than those who completed the post test

more than two months (61 days or more) later.

b. Students subjected to the traditional five-day academic week scored significantly higher on the delayed post-test when completing the test within two months (34 to 60 days) from the final examination than those Treatment Group 1 subjects completing the post test more than two months (61 days or more) from the final examination. Also, those Treatment Group 1 students completing the post test within one month (33 days or less) of the final examination scored significantly higher on the delayed post test than all other Treatment Group 1 students. In summary, the sooner the students were retested, the better their retention scores.

c. Perhaps the most important finding of this study is that Treatment Group 2 students subjected to the experimental four-day academic week showed no statistical interaction based on elapsed times between final examination and the delayed post test. This finding is extremely interesting because it is unexpected. However, the data do not robustly support a causal relationship and further research in this area is highly warranted.

Anecdotal Findings

Instructor attitude was surveyed only anecdotally. Prior to initiating the study, instructors were briefed by the experimenter as to the procedures required. Several instructors were interested in the purpose of the study and the course selection process. There was also some anxiety and trepidation observed, though most instructors were eager to participate because it represented a change from the heavily regulated status quo. One set of course instructors required additional prodding by the COMTRALANT staff to commence.

Getting the Navy to participate in the study was not as difficult as imagined. With

persistence, the experimenter convinced the decision makers of the practical benefits to the Navy and the general contribution to educational research. While blessed with "insider" assistance, it is concluded that non-insiders could reproduce this study or conduct other research using Navy classrooms.

It was surprising to note that the Navy had not developed post tests nor invested much in empirical follow-up course evaluation. Thus, a byproduct of this study for the Navy was the means of preparing post tests and the methodology for conducting meaningful study.

The Navy was also able to take advantage of a holiday-shortened week for training that ordinarily would have been forfeited. Instructors involved in the study convinced schedulers to add a compressed week session to the training calendar. The result, more students received the valuable training. Additionally, per diem expense savings are also directly attributed to the experimental week's introduction. These expenses are paid to government employees who are attending school away from their ordinary employment locale. Potential savings accrued by virtue of not attending classes on the fifth day may be extremely important to the Department of Defense in an era of limited fiscal resources.

Some instructors were initially pessimistic about the four-day week's anticipated success. Assurances and procedures were established for "fifth day" remediation, if necessary. These instructors were relieved when no one failed in any compressed week session and expressed their preference for the novel week.

Importance of the Study

This study was conducted to investigate the effects of altering the instructional delivery schedule on student achievement and knowledge retention. Because the military classroom

incorporates standard principles of adult learning, this study also hoped to provide relevant information necessary for corporate, military, and urban education policy makers for planning or restructuring instructional delivery schedules.

In summary, it is concluded that the four-day compressed instructional delivery week is effective. Analysis of student achievement data from this study revealed that both treatment modes produced a high degree of effective learning as evidenced by final examination results. Knowledge retention data for the experimental treatment group were comparable to those from the traditional schedules and there is some evidence that the four-day week may even produce less knowledge decay beyond 60 days than the conventional five-day week.

Recommendations

This study was conducted to investigate what effect altering the instructional delivery schedule would have on student achievement and knowledge retention. This study strongly posits the four-day compressed week schedule as an effective delivery system for adult learning and retention. It is recommended that variables in this study continue to be manipulated and investigated.

Further research might also examine other variables not included in this study such as student and instructor attitude toward the four-day school week and empirical evidence of cost savings to different stakeholders. Other adult educational settings (urban, corporate) could be studied in a different environment and confirm these findings.

Time management and instructional scheduling will continue to be a focus of planners and scholars. Continued investigations should hope to identify optimum instructional delivery strategies and systems that will contribute to student achievement and cost effectiveness.

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Appendices

Appendix A

COMTRALANT Sponsorship Letter

1500
Ser N62/ 0706
15 MAR 1992

From: Commander, Training Command, U.S. Atlantic Fleet
To: Commanding Officer, Fleet Combat Training Center, Atlantic
Commanding Officer, Fleet Training Center, Norfolk
Commanding Officer, Navy and Marine Corps Intelligence
Training Center

Subj: COMTRALANT-SPONSORED GRADUATE EDUCATION RESEARCH STUDY

Ref: (a) COMTRALANT ltr 1500 Ser N62/3814 of 1 Nov 91

Encl: (1) Point Paper

1. Your command has been selected to participate in a graduate research study in conjunction with Old Dominion University, Norfolk, Virginia (reference (a) refers). As outlined in enclosure (1), the project requires a modification in the conventional training week schedule. Instructors designated to participate in this study have been pre-briefed by the researcher and provided materials for collecting data throughout the duration of the project.

2. Your support of this research project is important, especially in a climate where we need to look at increasing our training efficiency, reducing training redundancy and establishing ways to measure the effectiveness of our training. My staff point of contact, LCDR R. A. Goldenberg (N62), 444-5854, is standing by to assist with questions and provide liaison with your instructors.

W.F. STORY
Chief of Staff

Copy to:
FCTCLANT (CISO, N224, N222)
FLETRACEN Norfolk (N346)
NMITC (CISO, N13)

Appendix B
Course Descriptions

1. Advanced Communications Procedures (Catalogue of U.S. Navy Training Course of Instruction Number J-201-0807)

The Advanced Communications Procedures course was taught at Fleet Training Center, Norfolk, Virginia. The course is also conducted at Fleet Training Center, Mayport, Florida. The standard course length is five days. The purpose of the course is to train Communications Watch Supervisors in advanced communications procedures at a level to promote more efficient accomplishment of their duties in supervisory and operational situations. This course provided classroom instruction in: Wave propagation and frequency theory, Communications administration procedures, Communications operations procedures, Various communications systems, Security, and Training. This course also provided practical exercise in: Message formats, Communications plans, Operations orders usage, Authentication, and Nuclear commands. This course may also be offered by video teletraining from Fleet Training Center, Norfolk, Virginia to Fleet Mine Training Center, Charleston, South Carolina; Fleet Training Center, Mayport, Florida; Naval Education and Training Center, Newport, Rhode Island; and Fleet Combat Training Center, Atlantic, Dam Neck, Virginia.

2. Combat Systems Alignment (CSA) Theory (Catalogue of U.S. Navy Training Course of Instruction Number J-2E-1103)

The Combat Systems Alignment (CSA) Theory course was taught at the Fleet Combat Training Center, Atlantic, Dam Neck, Virginia. The course is also conducted at the Fleet Combat Training Center, Pacific, San Diego, California. The standard length of the course is five days. The purpose of the course is to train CSA technicians in general shipboard alignment procedures to include basic theory, equipment used, transferring of center lines, productions of graphs and

charts, and safety precautions.

3. Harpoon Watch Officer (Catalogue of U.S. Navy Training Course of Instruction Number K-2G-0151)

The Harpoon Watch Officer course was taught at the Fleet Combat Training Center, Atlantic, Dam Neck, Virginia. The course is also conducted at the Fleet Combat Training Center, Pacific, San Diego, California. The standard length of the course is five days. The purpose of this course is to train Anti-Surface Warfare (ASUW) Watch Officer personnel to function as decision makers in the employment of surface launched harpoon missiles. This course addressed Harpoon Weapons Systems (AN/SWG-1/1A) missile variants and capabilities; seeker mode selection; aim point offset; all phases of over-the-horizon detection, classification, and targeting (OTHCD&T); environmental corrections; and Battle Damage Assessment (BDA). It is specifically designed for E-6 to O-3 personnel who stand watch in the Combat Information Center as ASUW Evaluators/Watch Officers. Commanding Officers, Executive Officers, and Tactical Action Officers of harpoon capable ships may also attend.

4. Sensitive Compartmented Information (SCI) Administration and Physical Security (Catalogue of U.S. Navy Training Course of Instruction Number J-243-0984)

The Sensitive Compartmented Information (SCI) Administration and Physical Security course was taught at the Navy and Marine Corps Intelligence Training Center, Dam Neck, Virginia; and the United States Marine Corps Base, Camp Lejune, Lejune, North Carolina. The course is also conducted at the Fleet Intelligence Training Center, Pacific, San Diego, California. The standard length of the course is five days and students successfully completing this course earn a Navy Enlisted Classification (NEC 9190). This class is designed to provide active duty

military (E-3 and above) and DOD civilian personnel with the basic knowledge and skills required by a naval Special Security Officer (SSO) or Assistant SSO. Emphasis is placed on specific administration and security procedures used within a SSO Office. In addition, it provides an overview of physical security requirements for shipboard and ashore Sensitive Compartmented Information Facilities (SCIFs). Instruction in this course encompasses: Identification and proper performance of administrative functions and security procedures governing the special security program; Management of SCI billets, indoctrination, debriefs, and transfers; Completion of special background investigations (SBI), SBI forms, and submissions; Preparation of the checklist for SCIF accreditation and periodic inspection; General application of intrusion detection systems (IDS), telephone and intercommunication security, and audio security; and ADP security.

Appendix C

Sample Follow-Up Examination

**ADVANCED COMMUNICATIONS PROCEDURES
FOLLOW-UP EXAMINATION**

NAME: _____
 SSN: _____
 DATE: _____

PURPOSE: This examination is being administered to you and many of your Advanced Communications Procedures classmates. The results of this examination will be used exclusively by a graduate student at Old Dominion University and will not be reported to anyone in your chain of command. Thank you for taking part in this valuable educational study.

DIRECTIONS: You have fifteen minutes to complete the attached examination. Please do not use any notes, books, or receive any other help from shipmates. Please circle your answer choice on the exam pages. If you should change your mind on any answers, please be sure to indicate which answer you want scored. Lastly, upon completion, please staple this page to your exam and return everything to your training officer.

PRIVACY ACT NOTICE

AUTHORITY: 10 USC 1044

PRINCIPAL PURPOSE: The results of this examination will be used for statistical purposes only. This study is being conducted in conjunction with the Darden College of Education, Old Dominion University, Norfolk, Virginia.

ROUTINE USES: The use of these data is limited to statistical analysis only.

ADVANCED COMMUNICATIONS PROCEDURES
FOLLOW-UP EXAMINATION

1. The frequency range for the high frequency band is:
 - a. 3-30 HZ
 - b. 3-30 KHZ
 - c. 3-30 MHZ
 - d. 3-30 GHZ

2. The center of the frequency band assigned to a station is called the:
 - a. assigned frequency
 - b. suppressed carrier
 - c. operating frequency
 - d. window frequency

3. The ground wave is used for what type of communication:
 - a. long range in the MF/HF range
 - b. long range in the VHF/UHF range
 - c. short range in the MF/HF range
 - d. short range in any of the frequency ranges

4. How far in advance must guard shift messages be transmitted to the CSRF?
 - a. 24-48 hours prior to shift
 - b. 48-72 hours prior to shift
 - c. 12-48 hours prior to shift
 - d. 16-38 hours prior to shift

5. Shifting from one BCST area to another BCST area is an emergency BCST shift?
 - a. true
 - b. false

6. In a ship/shore circuit, who assumes NECOS?
 - a. the transmitting ship
 - b. the flag ship for the task force
 - c. NAVCOMTELSTA
 - d. none of the above

7. The BCST is an example of what type of circuit?
 - a. simplex
 - b. duplex
 - c. semi-duplex
 - d. half-duplex

8. Satellite broadcast designation is the November System?
 - a. true
 - b. false

9. An automated interface between autodin and the fleet is known as NAVMACS?
- true
 - false
10. What type of message is a White Rocket?
- an incident/event report
 - exercise for an OPREP-3
 - exercise for a Red Rocket
 - exercise for a White Pinnacle
11. The CNO can impose minimize world-wide?
- true
 - false
12. During minimize, traffic that is not important enough to be transmitted should be:
- hand delivered
 - held until minimize is lifted
 - mailed
 - none of the above
13. Who does mobilization apply to?
- U.S. Coast Guard when assigned to U.S. Navy control
 - U.S. controlled merchant ships
 - commissioned U.S. Navy ships
 - all of the above
14. The international lifeboat, liferaft, and survival craft distress frequency is:
- 500 KHZ
 - 8364 KHZ
 - 2182 KHZ
 - 2346 KHZ
15. A narrative COMMSPOT report must follow a voice report to NAVCOMTELSTA in relation to communication outages?
- true
 - false

Appendix D
Sample Cover Letter

Dear Training Officer:

I am currently stationed with the Iceland Defense Force in Keflavik, Iceland and working on my dissertation for a degree from Old Dominion University, Norfolk, Virginia. I am working with the staff of the Commander, Training Command, U.S. Atlantic Fleet to complete this project. Recently, the below named member(s) of your command attended the Advanced Communications Procedures class at FTC Norfolk. This course is part of my study as evidenced by the attached COMTRALANT letter. The purpose of this letter is to seek your assistance in completing the final phase of my data collection.

To this end, I need your help in administering the enclosed examination(s). Knowing that your time is very valuable, we have made the examination as short as possible, while still attempting to obtain the information I need for analysis. This examination is designed to take no more than fifteen minutes. Please administer the examination(s) upon receipt and return the information page(s) and examination(s) in the postage paid return envelope provided. If your operational schedule precludes prompt administration, please complete it as soon as you can. If these members have been transferred from your command, please forward to their new command with these instructions. Lastly, please strictly adhere to the "no help" rule described in the student directions, as this may confound the results.

Your generous cooperation and assistance in this study is greatly appreciated. As stated in the attached, the results of this examination are strictly confidential and will be used for statistical analysis only.

W. A. GEE
LCDR, USN and aspiring student

Please administer examination(s) to the following:

Appendix E

Biographic/Demographic Information
Request Form

BIOGRAPHICAL INFORMATION for statistical purposes

Name _____
SSN _____ Age _____
Rank/Rate _____ Pay grade _____
Gender (Circle One) Male Female
Command/Unit Presently Assigned _____
PRD _____

If PRD is less than three months from today, to what command will you report?

Today's Date _____
Course Title _____
Instructor(s) _____
Location _____
Years/Months of Active Duty Service _____
Years of Formal Schooling or grade last attended _____
Marital Status (Circle One) Single Divorced/Separated Married
Number of Dependents (do not include yourself) _____
Dependents living with you (Circle one) Yes No

Career intention: If you were to make the decision today, would you choose to reenlist/stay on active duty or seek a discharge?

Discussion _____

While looking towards the future, do you intend to stay on active duty at the end of your current obligated service or do you plan to seek a discharge?

Discussion _____

.....

PRIVACY ACT NOTICE

AUTHORITY: 10 USC 1044

PRINCIPAL PURPOSE: The information you provide on this questionnaire is used for statistical purposes only. This survey is being conducted in conjunction with the Darden College of Education, Old Dominion University, Norfolk, Virginia.

ROUTINE USES: The use of these data is limited to statistical analysis only.