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PROMOTING DISTANCE EDUCATION AT NAVAL POSTGRADUATE SCHOOL (NPS)

by

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March, 1996

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This thesis defines and supports five recommendations for Naval Postgraduate School (NPS) to promote its distance education program. The research and interviews in this study were primarily done to find the current barriers and requirements needed to conduct distance education on a larger scale. The research began with defining the Department Chairmen's concerns with distance education at NPS. Each recommendation, developed from the concerns, is supported by interviews with Department Chairmen, Educators, and Administrators, as well as, literary findings. Implementation requirements and benefits to both the DON and NPS are also provided for each recommendation.

The first recommendation this thesis supports is for NPS to develop a mission and vision statement for distance education. The second is to establish a NPS Distance Education Support Center to centralize campus efforts in distance education. The third recommendation is to institute a NPS Distance Education Marketing Plan to find potential customers and increase distance education interest on campus. The fourth recommendation is for NPS to immediately determine the cost for distance education in order to request additional funding from DON. Finally, the study recommends NPS begin a pilot program as a model for future distance education for active duty officers in the fleet. The proposed pilot program presented in this study is with HSL-41, a LAMPS Mark-III Squadron. With these recommendations, this thesis looks to make NPS the "Navy's Distance Education University." This study concludes with a time-line for implementing these recommendations.

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I. INTRODUCTION

Video teleconferencing (VTC) brings geographically dispersed organizations together at any given location. Whether for conferences, classroom sessions, or meetings, the 'high technological world' of VTC lets the world audio and visually reach more and more people reducing the number of missed opportunities caused by not being there. Today, VTC is a common 'household' business word. It is also growing within the government, military, and academic arena. VTC was once an expensive alternative due to the high cost of hardware and software development of VTC system components. Recent technological developments have lowered VTC operational costs and opened the doors for many up and coming VTC uses.

VTC is a new dimension in communications and technology transfer. VTC provides an economically feasible way for organizations to succeed as demands on individuals increase in a world of "doing more with less." Along with these increasing demands is a focus on reducing the amount of time to complete tasks. VTC allows individuals to achieve tasks without the required travel time and relocation requirements.

Over the past several years, VTC has made it big in the civilian realm of conducting business over hundreds to thousands of miles. The EPRI Journal regards compressed digital video teleconferencing as a technology that is increasingly preferred as a low-stress, low-cost option for long-distance utility business sessions (Quinn, 1993). This cost reduction and time-saving technique has value that the Department of Defense (DOD) organization must capitalize upon in dealing with other distant commands and

organizations on a regular basis.

The most common video teleconferencing is compressed digital conferencing that allows two-way video and audio communications. The general setting is in a conference room where individuals gather to conduct business. The participants gather just as if a meeting was called; the only difference is that there may be thousands of miles between the participants.

Distance education (DE) can be assessed as a form of VTC where point-to-point or multi-point teleconferencing provides interactive remote-site education. Distance education applications focus around the learner's needs, as well as the educational needs and objectives of the receiving organization. Distance education, sometimes called video teletraining (VTT), is the process of connecting remote learners with abundant resources. Distance education can be a cost effective and continuous means of distributing lifelong education and just-in-time training.

The use of telecommunications technologies for distance education is predicted to continually increase as educators grapple with decreasing dollars. Also the ability to share resources through technology promotes consolidation efforts and provides an alternative to building more buildings. With improved compression ratios and lower hardware and software costs, distance education will bring credit and continuing education into the workplace and home.

Naval Postgraduate School (NPS) has been conducting distance education since 1994. The current program, known on campus as Distance Learning, spans over several academic departments and offers two degree programs. The technological aspects of

NPS's video teleconferencing system are current and suits the School's present VTC uses. However, NPS's two VTC classrooms are under utilized, being used an average of only one or two hours a day.

With rising competition in the field of distance education there is a need for NPS, in view of budgeting and Navy requirements, to plan now for future growth and increased implementation of distance education throughout the DOD. NPS's academic structure coupled with its Naval support creates an environment in which planning and communication are essential. NPS must develop a plan to bring the different distance education concerns of the campus together and establish a common path encouraging and promoting distance education. With an established distance education outlook, NPS can remain competitive with other well-known and established universities. Distance Education is a key for NPS to fulfill the future educational needs of the DOD.

Through interviews with department chairmen, educators and administrators involved with distance education we have identified key areas to advance NPS's Distance Education Program. We also provide recommendations for an improved approach to distance education at NPS. Our thesis addresses support requirements, feasibility issues, training considerations, academic issues, and financial considerations.

Our thesis answers the following questions:

1. What are the barriers and concerns around campus with conducting distance education?

2. How can NPS promote its distance education program both on and off campus?

3. What support is required for NPS's Distance Education Program?

4. What will it cost NPS for promoting and increasing distance education?

5. What is the best feasible academic program to promote NPS's Distance Education?

II. METHODOLOGY

In this chapter we present a brief background of the material used to define our thesis, the methodology used in determining the recommendations, and our thesis structure.

A. BACKGROUND

Over the last several years the DOD has addressed how to begin video teleconferencing to enhance its mission. Defining a clear and definite approach to employing video teleconferencing for the variety of DOD organizations has been very difficult (Nerino, 1994). The undefined issue of video teleconferencing standards has been the main inhibiting factor in VTC application. The high cost of transmission and equipment fee is close behind the standards issue.

With equipment and transmission costs decreasing, reliable technology emerging, and international standards to ensure connectivity, now is the time for organization to begin planning for video teleconferencing (Quinn, 1994). NPS must take this a step further and begin planning for distance education to benefit the DOD. DOD needs to encourage individual organizations to explore video teleconferencing to increase video teleconferencing use DOD-wide and to receive its worldwide benefits. NPS needs to promote distance education to increase graduate education DOD-wide and enhance business and research opportunities worldwide.

NPS's current distance education program advertises that it provides DOD civilian and military personnel with the highest quality, most military-relevant graduate education

available anywhere (NPS Distance Learning Programs Leaflet, 1995). NPS's program offers two full-degree programs to two distant sites. The Aeronautics and Astronautics degree program is specifically tailored for users and managers of military aircraft and new weapons programs. The Electronic and Computer Engineering degree program is tailored for graduate study in military communication systems, computer networking, power systems, radar/electronic warfare systems, and signals intelligence. NPS is developing other programs in the Computer Science and Systems Management Curriculums. Appendix A outlines NPS's Distance Education Program and Video Teleconferencing System.

For over nine months we have been involved with the NPS Distance Education Program. We have sat on the Distance Learning Committee meeting and have sat in the video teleconferencing classrooms. We have also had over a dozen interviews with Mr. Tracy Hammond, Administrator of NPS Distance Learning Program, Dr. Dan Collins, Chairman of the Aeronautics and Astronautic Department, and Dr. Ted Lewis, Chairman of the Computer Science Department. From our observance of the School's program and our knowledge of current technologies and communication capabilities, coupled with our experience as members of the fleet and as students, we feel the current distance education program is lacking. NPS's Distance Education Program does not provide the DOD the breath of graduate education VTC can provide. Our conclusions about the current distance education program are the following:

- **User Satisfaction** - Members of NPS's Aerospace Department say that the student opinions form's (SOF's) have been positive. The students are very

satisfied with the VTT system performance and the information being provided. However, there have been complaints by professors that the technical support is lacking.

- **Strategic Value** - NPS's video teleconferencing role in achieving the long term, educational objectives of the organization at this time is very minute. However, it does have potential.

- **Technical Quality** - NPS video teleconferencing application is user friendly and of high quality. Equipment maintenance is minimal.

- **Technical Evolution** - The NPS video teleconferencing system can evolve with technological advances and easily expand to take advantage of new technology. For example it has the potential of transmitting over the KUBAND via satellite to deployed ships. NPS can expand the present VTC system allowing every department at NPS to conduct distant education courses.

B. THESIS METHODOLOGY

Our thesis provides recommendations to help improve the current NPS Distance Education Program. Our video teleconferencing literature research helped in getting a basic understanding of how a video teleconferencing system works. From our literature searches we could understand current technological applications and advances in video teleconferencing for future NPS Distance Education Program applications. Appendix B provides an overview of our findings and concerns in the field of video teleconferencing.

We interviewed several educational institutions conducting distance education to set the basis for our problem structure of "where is NPS Distance Education today?" Our interviews with representatives from the University of Maine, Presidio of Monterey Defense Language Institution, and University of New Hampshire provided initial analysis and comparison data. These institutions had been delivering education over video teleconferencing equipment for several years.

We define the problem as NPS has the state of the art video teleconferencing equipment system but the equipment is under utilized and the Distance Education Program in under developed. NPS is offering only two degree programs via distance education. We felt there are missed opportunities in providing graduate education to the fleet. We set out to find out why NPS's Distance Education was not reaching its full potential.

To learn why NPS Distance Education was being under utilized, we interviewed the academic department chairmen. The chairmen as the nucleus of the academic side of NPS know the DOD educational requirements and needs of their curriculum sponsors. We felt the Chairmen would be the most logical choice to find what possible barriers exist in providing distance education at NPS.

From the concerns expressed by the chairmen and our observance of the current program the following are our recommendations to advance the NPS Distance Education Program:

1. Develop a Mission and Vision statement for NPS Distance Education
2. Stand-up a centralized Distance Education Support Center
3. Develop a NPS Marketing Program for Distance Education
4. Obtain funding to support Distance Education throughout the DOD.
5. Set-up a pilot program with an active duty component, HSL-41.

C. THESIS STRUCTURE

Chapter III presents the chairmen's concerns in conducting distance education. We organized the chairmen's concerns into major areas that influence NPS's development of a

School-wide Distance Education Program. Our recommendations for successfully carrying out a distance education program were drawn from the major areas. Chapters IV through VII present the supporting material for our recommendations. Chapter VIII introduces a prime pilot program that NPS can develop to promote NPS's Distance Education Program. The chapter on the pilot program brings together significant issues found throughout our research and presents a type of program we feel will be the most successful for increasing NPS's Distance Education throughout the fleet. The final chapter is our conclusion and recommendations.

III. NPS CONCERNS WITH DISTANCE EDUCATION

A. INTERVIEWS WITH CHAIRMEN

We conducted interviews with 12 of the 15 academic department and group chairmen. Appendix C describes NPS's academic structure and academic departments and lists the academic department and group chairmen titles. We interviewed one curricular officer instead of the academic department chairman at the chairman's request. We use the information from these thirteen interviews throughout our thesis.

1. Objective of Interviews

The objective of the interviews was to come up with barriers to distance education identified by academic department and group chairmen. To prevent preconceived notations or biased answers we conducted the interviews individually and informally with each academic chairman. We informed each chairman that the interview was for thesis research. In beginning each interview, we explained the purpose of the interview as to identify the future of distance education at NPS. Specific questions from the chairmen as to the general objective of the interview we avoided as much as possible. We told the chairmen that we would maintain confidentiality of all the data collected. The interviews began with the basic question "Is your department currently involved in distant education or do you plan to be in the future? If yes, then tell us about it. If no, then why not?"

2. Analysis of Interviews

From the analysis of the interview information obtained from the chairmen we identified five areas of concern with the application of distance education at NPS. During

our interviews with department chairmen we noted significant comments they made. We compiled a matrix of these significant comments and their associated departments. From our matrix we grouped comments together by association to a common subject.

Figure 3.1 and Table 3.1 depict department chairmen's breakout on concerns of NPS Distance Education Program. The letters in each column of Table 3.1 represent the 13 different departments interviewed. Each row contains a specific area of concern. The numbers in each column represent the number of concerns each department had in a specific area. For example, Department A had five concerns in the area of Support.

In Figure 3.1 the "X" axis represent the 5 areas of concerns that corresponds to rows in Table 3.1. The "Y" axis represents the totals in the table. For example, Support has the largest total of related concerns with a total of 44 specific concerns.

	Areas of Concerns	Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Support	5	0	2	1	6	1	7	3	5	6	6	1	1	44
2	Customer	3	5	2	2	5	1	6	1	5	4	2	3	4	43
3	Administrative	3	2	0	4	2	0	2	3	2	2	1	1	0	22
4	Need Requirements	2	0	1	0	1	0	2	1	3	2	3	0	0	15
5	Funding	1	1	1	1	1	1	1	1	1	1	1	1	1	13

Table 3.1 Department Concerns Summary

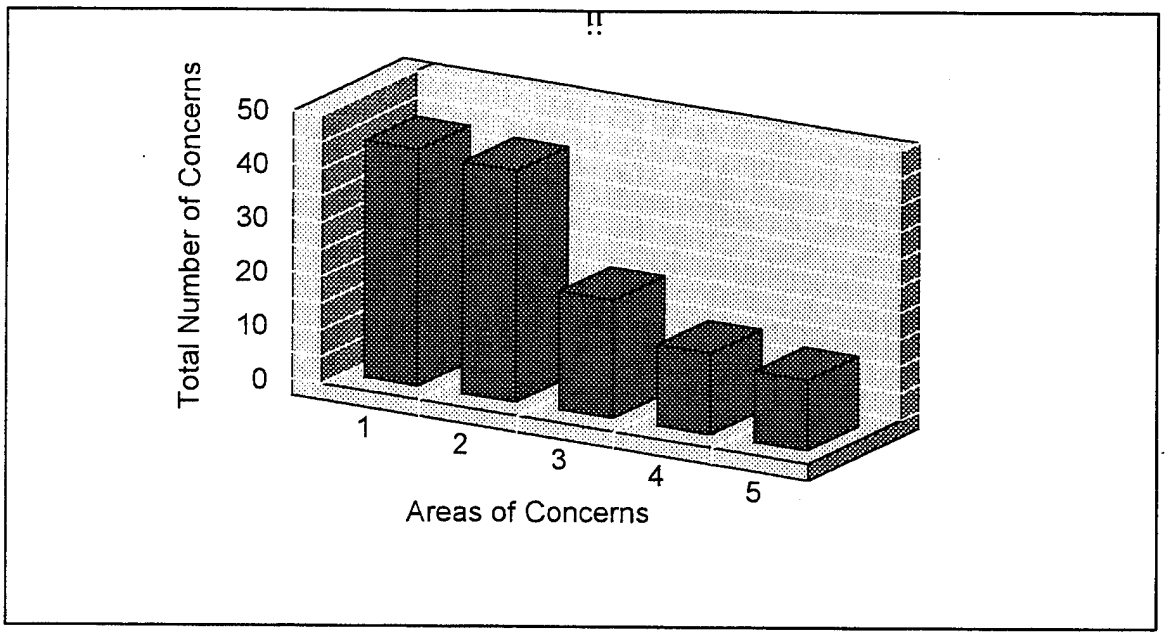

Figure 3.1 Department Concerns Summary

B. FIVE AREAS OF CONCERN

1. Support

Support was the number one concern expressed by the chairmen. Chairmen identified support with comments ranging from presenting a technical understanding of video teleconferencing to scheduling a distance education course. The main reason it was ranked number one was because of the many aspects it covers. Support includes equipment maintenance, technical response and training on VTC, as well as required additional time and resources. The most pronounced request was to have a centralized full-time support technician and administrator to provide guidance, instruction, and assistance. We define the support concerns at length in Chapter V where we recommend a Distance Support Center to adapt to the chairmen's request for support.

2. Customer

Identifying the customers and the customers' needs were top concerns of the faculty. The chairmen's concerns ranged from identifying the customer to dealing with a customer who is willing to take the initial inconveniences and bloopers associated with a first-time distance education program. Chairmen are concerned with finding the time to find distance education customers. The chairmen who have already identified their customers are concerned with identifying and meeting the customers' needs. We further describe these concerns and others in Chapter VI where we identify a marketing plan as a recommendation to improve distance education opportunities.

3. Administration

The factors that deal with the successful administration of School-wide distance education were on the minds of many chairmen. Concerns with administering labs and devising new teaching plans were the highlights of the concerns. Many chairmen felt that initializing a distant education program at this time without additional resources would be difficult due to other priorities within their department. The chairmen anticipate the requirement of a new teaching plan and technique to ensure distant-end students receive all required materials and objectives. Chapter V, the recommendation for a support center, highlights these concerns and others in the administration of a distance education program.

4. Need Requirement

Throughout our interviews with chairmen, they continually questioned NPS's need to employ distance education. We feel the NPS Administration must define for the School

the need for distance education. The chairmen's concerns were mainly the need to identify the potential payoff with distance education and the need to identify a School-wide Distance Education Program objective. Chapter IV supports a recommendation for NPS to develop a mission and vision statement to identify the School's distance education goal and objective.

5. Funding

Every chairman was concerned with funding to support a distance education program. The number one question each chairmen stressed was where would the funds come from to support their efforts in beginning a distance education program. According to most chairmen, time and resources for establishing a curriculum over VTC require additional funds. One chairman did feel that with VTC capabilities a professor who is completely ready to teach an on-campus course should be prepared to teach a distance education course. The reason this concern is at the end of the list of concerns is because there were not many individual concerns supporting it. Funding was in a class by itself and yet it is very important to chairmen for a successful distance education program. We focus on funding NPS's Distance Education Program in Chapter VII.

C. SUMMARY

Throughout the interviews the chairmen were open to the ideas and possibilities distance education offers. The number one concern voiced by many chairmen was support. Distance education draws a spark to everyone's eye yet many chairmen do not have the time nor the resources to fully explore video teleconferencing capabilities.

Chairmen would like a central place on campus to find out what is being done with

video teleconferencing. They would like assistance in researching facilities presently involved in teleconferencing and identifying concentrated areas where they can offer their curriculum. Chairmen want the flexibility to decide what the structure within their department should be for providing distance education. Before many chairmen set out to put a distance education program on-line, they want to be assured that distance education will be part of the School's future. Concerns are a natural element of change. Distance education is a change for NPS. The concerns of NPS's chairmen are not new to the application of technology in education.

> Barron (1987) reviewed the literature on the study of barriers to implementation of technology in education and concluded that, while little research had been conducted, the acceptance of teleconferencing in higher education, was "considered with more hesitation and suspicion by some educators." Barron cited Dirr's major barriers to the implementation of courses a 1) lack of money to support the effort, 2) lack of faculty commitment and 3) lack of trained support staff. Barron (1987) found that faculty had concerns for the students, the size of the classes, discussion and face-to-face involvement and lack of support for themselves from peers and instructors. (Portway, 1994)

The following chapters expand upon the concerns voiced by the department chairmen and present recommendations for meeting the concerns and improving the application of NPS's Distance Education Program.

IV. MISSION AND VISION STATEMENT FOR NPS DISTANCE EDUCATION

NPS must develop a distance education mission and vision statement for a successful and well-thought out distant graduate education program. Mission and vision statements are critical to any organization. This chapter highlights the research we conducted and provides implementation strategies for establishing NPS's Distance Education Mission and Vision Statements.

A. PURPOSE

A distance education mission and vision statement defines NPS's future existence of distance education. The statements allow a more realistic and analytical view of the relationship between the present state and the extension or modification of that state to meet future educational needs. A mission and vision that individuals can follow and uphold assists NPS in a paradigm shift. A well-structure and defined look toward the future of graduate education with advanced technology is necessary if the School is to fully support and promote distance education.

B. RESEARCH

1. The Paradigm Shift

NPS cannot move into a well-established distance education program without change. Change is brought about with a new way of thinking about education. Education over a distance has to be on the agenda of administrators, faculty, and support staff. A paradigm shift must occur, with the focus moving from on-campus education to one combining on-campus and distance education.

> A paradigm as defined by Adam Smith (1975) is "A shared set of assumptions. The paradigm is the way we perceive the world. The paradigm explains the world to us and helps us to predict its behavior." Smith concludes that when we are in the middle of the paradigm, it is hard to imagine any other paradigm. (Portway, 1994)
>
> Barker (1992) stated: "A paradigm is a set of rules and regulations (written or unwritten) that does two things: (1) it established or defines boundaries; and (2) it tells you how to behave inside the boundaries in order to be successful." (Portway, 1994)

Right now in education a paradigm shift is taking place. NPS can recognize this paradigm shift and take advantage of it by making distance education at NPS a priority. Timing is a key to successful application of distance education. The time is now. The recognition of the present need for distance graduation education besides just resident graduate education will make NPS's Graduate Education Program successful.

A paradigm shift involves many factors that rely on perceptions. A paradigm shift is not a clear-cut shift. This clear-cut shift takes place anytime a crisis occurs. In this situation, a crisis can be the realignment of forces or cutbacks in the nation's defense structure.

A paradigm shift usually begins when a crisis occurs. In reality NPS has begun a paradigm shift. The shift began with the Congressional Base Realignment and Closure Committee (BRAC) hearings. The BRAC hearings generated concern for the closure of NPS. The Navy took a close look at what graduate education meant in meeting its mission. The committee challenged NPS's mission, objective, and effectiveness in meeting its mission. NPS survived the BRAC hearings and remains open to provide the DOD graduate education.

The challenge to NPS's mission alerted the School to take a hard look at the way it meets the needs of the DOD in providing graduate education. Distance education is a new way of meeting the needs of the DOD that NPS can adopt and effectively institute. NPS also currently faces a decreasing enrollment due to cutbacks throughout DOD. Academic quotas for enrollment continually do not meet required levels. It has been said that in a time of crisis people look to a new way of providing their service. NPS needs to develop a new way of meeting their enrollment requirements and simultaneously consider the needs of the customer.

> Barker states that in times of crisis, people expect and demand great change. The willingness to accept great change generates two results: More people try to find new ways; i.e., new paradigms, to resolve the crisis, thus increasing the likelihood of paradigm shifts. Because of the crisis mentality, more people are willing to accept fundamentally new approaches to solve the crisis, thus increasing the opportunity to change paradigms. This sets the stage for radical change. (Portway, 1994)

Barker provides the following sequence for a paradigm shift:

1. The established paradigm begins to be less effective.

2. The affected community senses the situation, begins to lose trust in the old rules.

3. Turbulence grows as trust is reduced (the sense of crisis increases).

4. Creators or identifiers of the new paradigm step forward to offer their solutions (many of these solutions may have been around for decades waiting for this chance).

5. Turbulence increases even more as paradigm conflict becomes apparent.

6. The affected community is extremely upset and demands clear solutions.

7. One of the suggested new paradigms demonstrates ability to solve a small set of

significant problems that the old paradigm could not.

8. Some of the affected community accepts the new paradigm as an act of faith.

9. With stronger support and funding the new paradigm gains momentum.

10. Turbulence begins to wane as the new paradigm starts solving the problems and the affected community has a new way to deal with the world that seems successful. (Portway, 1994)

We feel turbulence has been created at NPS. The research illustrated below shows that department chairmen are concerned and are requesting guidance in distance education. Many chairmen strongly support distance education. NPS must build a foundation for a new approach to graduation education. The Administration must begin the "trusts" of the required foundation with a mission and vision statement for NPS's Distance Education Program.

NPS must modify its defined boundaries and procedures for educational success to include distance education. The NPS mission and vision statements, presented in Appendix D, need to encompass distance education. The only way distance education can be successful at NPS is if the Administration defines the need for distance education, puts the need in writing, and guides the School through the change.

Having a mission and vision statement is not new to the military. A mission is what gets the troops to the battle and the war won. A vision helps guide the individuals in fulfilling the mission. Leaders use missions to build high performance teams and gain commitment within those teams. An organizational mission is an incentive for the entire organization. An organization's vision is the organization's guidance to and objective for the future.

> Mission: Helping people believe in the importance of their work is essential, especially when other forms of certainty and security have disappeared. Good leaders can inspire others with the power and excitement of their vision and give people a sense of purpose and pride in their work. Pride is often a better source of motivation than the traditional corporate career ladder and the promotion-based reward system. Technical professionals, for example, are often motivated most effectively by the desire to see their work contribute to an excellent final product. (Kanter, 1992)

NPS's mission has provided its people a sense of pride and commitment toward enhancing the security of the United States. This is evident throughout the campus. Whether talking with a student or faculty member, they express the objective of their efforts as for the good of our nation's defense.

Around campus the same cannot be said about distance education. Although NPS has been doing distance education for over a year, very few students, faculty and department chairmen are aware there is a distance education program on campus. During our interviews with department chairmen seven out of thirteen were aware that NPS had a distance education program. Often many chairmen felt distance education was just in the test and evaluation stage and not yet available for use. Figure 4.1 and Table 4.1 depict department chairmen's breakout on awareness of the current NPS Distance Education Program.

2. Chairmen Concerns

Interviews with department chairmen centered on the concern for a defined need for distance education. Most chairmen felt that their efforts toward a distance education program would not get off the ground until the School identified the need for distance

education. The chairmen were concerned about placing time and people on a program not actively supported by the administration.

Areas of Concern		Departments												
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Aware Of Current Program	1	1		1					1	1		1	1	7
2	Conducting Distant Education	1	1										1	1	3
3	NPS in Test And Eval Stage	1					1					1			3
4	Department Planning Program					1		1			1				3

Table 4.1 Current Distance Education Program

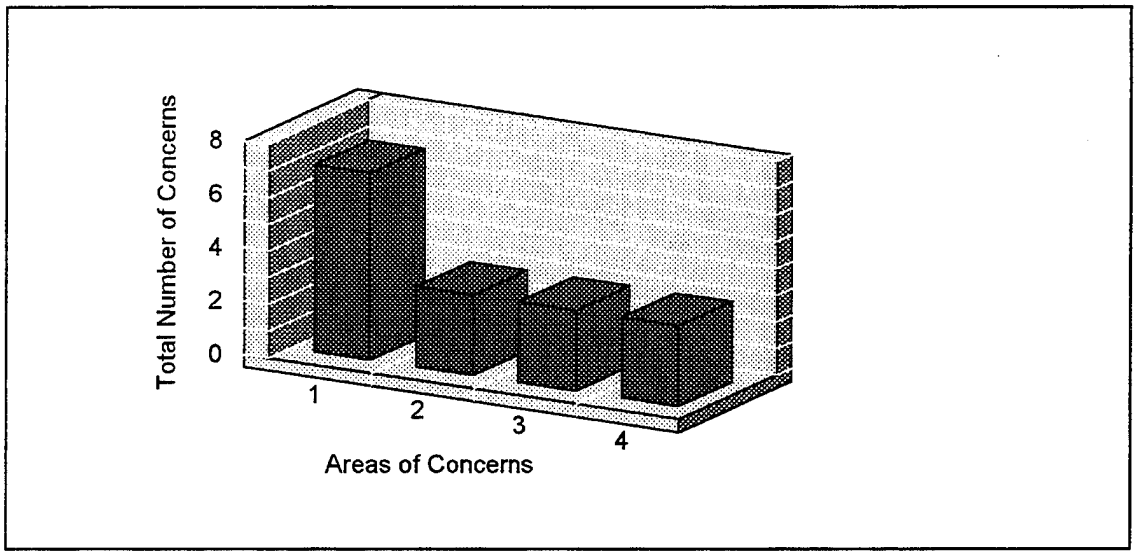

Figure 4.1 Current Distance Education Program

Planning for the implementation of the program requires a major investment in time, people and funding. Serious consideration should be given to the number one critical factor: "identification of the need for the program." All the experts agree that without this identified need, an institution should not move ahead to purchase equipment, hire people, or even think about delivering a long distance program. Faculty involvement, incentives, motivation and training were ranked as serious issues for these successful institutions. (Portway, 1994)

Throughout all the interviews with the chairmen they were eager to hear more about and learn about distance education. The chairmen were a bit stand-offish at first until they talked through their views of distance education and realized that we were interested in what they had to say. They all voiced that a strict "you will do this type of distance education" was not what they would conform to. Each chairman would like to do distance education in a form (like short two-week courses or just refresher courses) that would best suit the needs of his department. The chairmen want to be able to tailor the type of distance education program they offer just as they tailor their curriculum.

The chairmen suggested diversified and department-specific distance education programs. Just as today each department at NPS is unique in its educational requirements, the chairmen agree that their future incorporation of distance education will be unique to their department's structure. Some chairmen even expressed an interest in more than one type of program. The types of programs mentioned by the chairmen were the following:

- Two Week Short Courses - Present interested parties with updates in an academic discipline.
- Partial Degree Programs - Offer refresher quarter courses and introductory (first year) courses to students via distance education and complete graduate degree (second year courses) on campus.
- Full Degree Program - Offer entire graduate education degree program via distance education program.
- Continuing Education Program - Offer courses to graduates of NPS to allow them to keep abreast of recent advances in their disciplines.
- Seminars and Guest Lectures - Offer seminars and receive guest lectures from distant sites. Not a full program but uses distance education equipment.

Figure 4.2 and Table 4.2 illustrate the breakout among chairmen in support of the different types of programs.

	Areas of Concern	Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Two Week Short Course Interest	1				1		1	1	1	1				6
2	Partial Degree Program				1	1		1			1			1	5
3	Continuing Education Program					1		1		1	1				4
4	Full Degree Program		1										1	1	3
5	Support Other Programs			1								1			2
6	Seminars and Guest Lectures						1			1					2
7	No Program			1											1
		1	1	2	1	3	1	3	1	3	3	1	1	2	23

Table 4.2 Types of Future Distance Education

The chairmen need reassurance that the School is going to support the efforts in distance education before their departments begin a distance education program. Some chairmen (about one-fourth) may need some more incentive before beginning a program. Our opinion is that once the motivated chairmen become more involved with distance education the other one-fourth will follow.

The chairmen mentioned that faculty involvement is already evident in their departments. Most of the chairmen identified at least one member of their faculty who has some type of interest or involvement in distance education or video teleconferencing. Figure 4.3 and Table 4.3 show department faculty interest in distance education as expressed by the department chairmen.

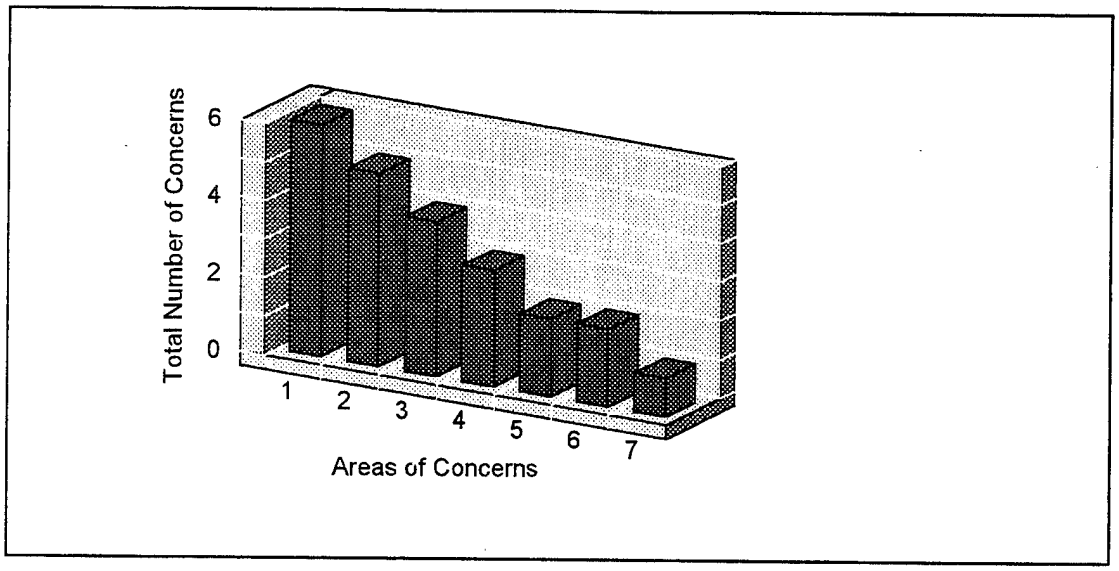

Figure 4.2 Types of Future Distance Education

a. Unify School's Distance Education Need

Chairmen felt that the School has not yet defined its stance on distance education. Many chairmen feel that distance education on campus is still in the test and evaluation stage. They are waiting for someone to define the School's need and plan for distance education.

- *"Need to find the real need and fulfill that need. Then distance education will be successful."*

Areas of Concerns		Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Faculty Enthusiasm Evident	1	1				1	1	1	1	1	1	1	1	10
2	Faculty Manning	1					1	1	1	1	1	1	1	1	9
3	Some Faculty Resistance		1						1	1					3
		2	2	0	0	0	2	2	3	3	2	2	2	2	22

Table 4.3 Faculty/Manning

Chairmen stressed that in the educational environment change does not

occur fast. Teaching has occurred in a single classroom with direct student-to-teacher interaction for years. Introducing a new forum for this interaction will take time and acceptance. Chairmen must understand the need for distance education before they begin organizing distance classes.

- *"Change does not occur fast. It will take time to implement distance education with teaching career people. They are rationalizing and detailed individuals by nature and it will take a lot of time to sway them and get them to move. ...You will need an extreme group to move ahead and the others will follow."*

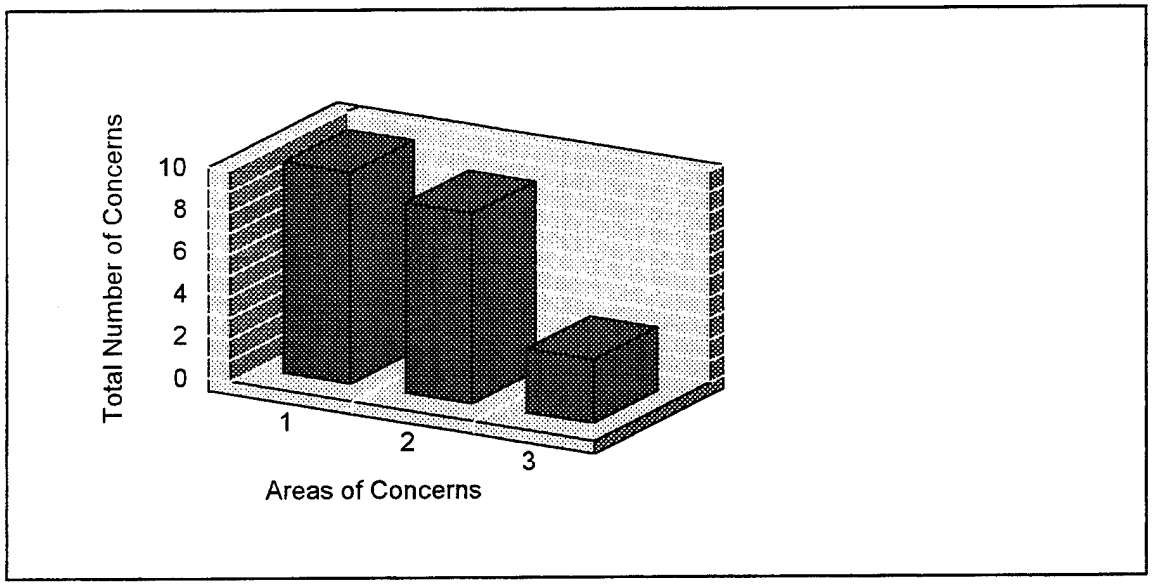

Figure 4.3 Faculty/Manning

Most of the chairmen's concerns were about the foundation upon which the School would build the program. The concern is that each department will go in their own direction developing a distance education program and the School's program would be "ad hoc" and disjointed. Some chairmen compared it to the School's current

communications network that was augmented from time to time in an "ad hoc" fashion to meet specific communications needs. A disjointed distance education program will not benefit the School nor save on resources. Since NPS's Distance Education Program is in the beginning stages the chairmen felt the planning stages should be a united effort. A united effort would encourage information technology resource sharing, consolidate training and support services, and support the sharing of lessons learned to promote a more effective School-wide program.

b. Potential Payoff

Along with the establishing a unified School need chairmen need to see the potential payoff. Before chairmen commit to distance education they want to understand the benefits of distance education.

- *"Need to sell the item, which is distance education. In education you tend to do over and over what works . . . large peer evaluation . . . continuous improvement . . . so if something works why change it."*

The chairmen feel that if the potential for payoff is established campus-wide then the faculty in the departments will buy off on distance education. Right now the faculty does not know if there is anyone out there who would be interested in distance education. About 50 of the chairmen have acknowledged that their academic sponsors are interested or have mentioned distance education. This information however has not reached the faculty.

- "We would have to restructure our curriculum . . . have to put labs in the last two quarters to make a more efficient process for distance education . . . which

we are willing to do and have considered . . . not willing to do all the work until we hear from the School that distance education is the way of the future."

- "We will need professors to want to do distance education of their own free will . . . promote by example . . . have them see the potential benefits of distance education."

Chairmen identified several distance education opportunities within their departments. They stated distance education would bring in more students, more customers, and may even introduce more research opportunities. The potential payoffs are present but the chairmen need to be assured that the School is behind their venture into the world of distance education.

c. Identify DE Program Objective

Before chairmen begin carrying out distance education they would like the objective of distance education identified. At this time the chairmen want to be assured that distance education will not replace the traditional methods of providing graduate education.

- *"We need to know what the real objective of distance education is. Why should the School even bother with distance education? What are the driving forces? You need to give strong incentives for the School to implement distance education. Is the School's survival dependent on distance education?"*

- *"Survival . . . Will distance education make NPS important enough so that they will not shut us down?"*

d. No Advantage to Distance Education

One chairman out of thirteen we interviewed felt that there was no advantage to distance education within his department. He based his decision on the small

number of students in his curriculum's full degree program. He did however feel he could support other curriculums in their efforts in distance education. This chairman would provide faculty members from his department to teach distance education courses for the other curriculum requirements. There will be a need for his department to provide distance education courses if other departments carry out distance education, but on his own he will not seek out distance education. Figure 4.4 and Table 4.4 illustrate the chairmen's concerns by department breakout.

Areas of Concerns		Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Unify School's Need	1				1		1		1	1	1			6
2	Potential Payoff	1						1	1	1	1	1			6
3	Identify Program Objective									1		1			2
4	No Advantage			1											1
		2	0	1	0	1	0	2	1	3	2	3	0	0	15

Table 4.4 Need Requirements

3. Present Distance Education Committee

For over nine months we sat in on the NPS Distance Education Committee's meetings. The chairman of the committee is Professor Maurice Weir. However, Mr. Tracy Hammond conducted the dozen meetings we attended. The members present on the committee varied from meeting to meeting. Updates on situations dealing with the setting-up of current distant education courses were the committee's main agenda items. The items the committee discussed ranged from overcoming the difficulties in distant-site coordination in setting up a course to pricing a single session use of the video teleconferencing system.

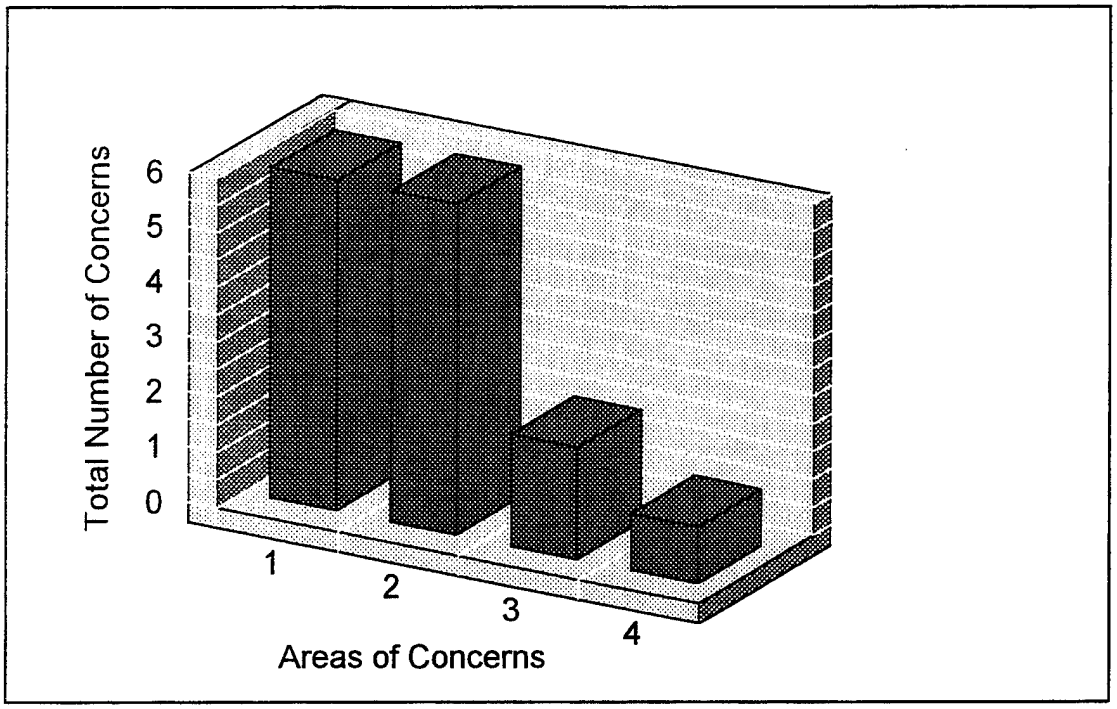

Figure 4.4 Need Requirements

The committee did not carry agenda items over from one meeting to the next. Committee members did not identify action items nor assign responsibilities for carrying out business items. The committee seemed to lack a sense of direction and purpose. If there was an assigned purpose and direction to the committee it was not evident to the casual observer. We felt this reflected the lack of an established need and direction of NPS's Distance Education Program.

C. REQUIREMENTS TO IMPLEMENT

1. A Change Strategy

> Many educators remain hesitant, for the most part, to use the new technologies for educational purposes. Studies in both innovation and decision making theory, as well as research in the use/non-use of the technologies indicate that more research needs to be

> conducted to bring together the educator and the appropriate technology for the message. While there is evidence of the barriers related to cost, compatibility, communication and support, research also indicated that the positive presence of those same factors act as "advantages" for use. Strategic planning to implement distance education programs enables organizations to plan for these barriers and optimize the advantages of the partnership between education and technology. (Portway, 1994)

Even if we know exactly where we want to be in ten years and what the National Information Infrastructure will be . . . and even if we knew how much funding we could count on to get us there, we would still need to plan. (Portway, 1994) NPS must begin planning for distance education if it is to remain competitive in graduate education for the fleet. Technology has made its approach faster than anyone would have imagined ten years ago. "Blanchard (1994) suggests that we can 'make the times change faster' through planning. He bases his recommendation for a viable blueprint for the pending evolution on a study of six organizations (Beer, Eisentat, and Spector, 1990) on the process of change that leads to performance improvement." (Portway, 1994)

The six-step change strategy includes:

1. Mobilize commitment
2. Develop a shared vision
3. Foster consensus
4. Spread revitalization without directive
5. Institutionalize revitalization through formal policies
6. Monitor and adjust strategies. (Portway, 1994)

We feel NPS needs a plan. Commitment, vision, consensus, directive, and policies

all need to be a part of that plan. We want individuals identified to begin a long-term plan for NPS's Distance Education Program. Through our research we found Mr. Tracy Hammond, Dr. Ted Lewis, and Dr. Dan Collins to be the individuals on campus most behind distance education. We suggest these individuals be involved in the initial planning.

For a plan to be successful there must be top-level support. NPS's top-level support needs to be expressed to the department chairmen. NPS's support of distance education needs to reach everyone on campus.

To gain top level support of distance education the School must identify the need and benefits of distance education. We have tried to identified these needs throughout this thesis.

> Pearson (1990) identified a model specifically for distance education programs. There were nine elements in the program; to be successful, all must be followed.
>
> 1. Decide to plan for change: Awareness
> 2. Recognize real vs. perceived need: Interest
> 3. Understand the real reason for implementation: Advantage
> 4. Mission of the organization: Evaluation
> 5. Plan the program: Trial
> 6. Review What the organization does now: Observability
> 7. The gap: Compatibility
> 8. Contingency: Pre-Adoption
> 9. Implementation: Adoption (Portway, 1994)

We believe a model similar to Pearson's is what NPS needs to promote its current distance education program. To make distance education successful at NPS the following steps need to be implemented at a minimum.

1. Gain NPS Administration and DON support of distance education at NPS.

2. Determine the need for NPS Distance Education (NPS and DON.)

3. Figure out costing formula and consider cost concerns (NPS and DON.)

4. Develop a marketing plan for distance education that focuses on obtaining external customers, internal support, and external funding.

5. Develop a distance education administration and support staff to carry out the program.

Ideally to promote distance education, first the School would need the active support of the Superintendent, Provost, and senior academics leaders (deans and chairs) in moving toward full-campus involvement in distance education. For the Superintendent, Provost, and others to fully support the program they would need to know the need NPS has for distance education. They need to understand current trends and developments in distance education (i.e., what distance education can accomplish, what it provides, what it costs, what resources are needed, who is interested, and who are the potential customers.) To answer these questions, the School needs a formal team to research these areas and make suggestions. The team then prepares a distance education plan. The plan is submitted to Admiral/Provost for approval and support. The Administration defines the need for distance education for the School based on the plan. The plan is then marketed to the customer and throughout the faculty to gain support and commitment. The plan is carried out and NPS has an active distance education program to service the DOD. The plan continues this cycle for updates and reforms.

2. Develop a NPS DE Mission and Vision

In developing a plan NPS must make the objective clear to all participants. A distance education mission and vision statement would state NPS's objective and how that objective is carried out. NPS must become the Navy's Distance Education University. Ideally a team of individuals from the campus should put together a mission and vision statement. We have built a statement in support of distance education based on our research.

a. The DE Mission

The distance education mission of the Naval Postgraduate School is to provide advanced professional off-campus studies at the graduate and professional level, e.g., short courses, for military officers and defense officials from all services. NPS Distance Education will enhance the School's focus of increasing the combat effectiveness and readiness of the armed forces of the United States by providing quality education throughout the world via communications links in support of the unique needs of the defense establishment.

b. The DE Vision

The distance education vision of the Naval Postgraduate is to be the most sought out institution for distance education by members of the armed forces for our quality education and our commitment to people. We will reach the armed forces with up-to-date communications technology in providing an educational experience that will not only benefit the student but the DON as well. The benefits of NPS's research will flourish as we obtain direct video communications and interaction with those we support. We will

be the Navy's Distance Education University.

D. BENEFITS

The benefits of implementation of mission and vision statements are:

- Overcome barriers presented by department chairmen
- Gain top level endorsement of a unified School distant education program
- Build a stronger foundation for the distance education program
- Begin a road-map for the establishment of distance education short-term and long-term goals in support of the School's overall mission

V. NPS DISTANCE EDUCATION SUPPORT CENTER

A support center will bring the NPS's distance education program into full swing campus-wide. Many chairmen require additional support to setting-up a distance education program and centralized support would reduce the cost of the program. In this chapter we present NPS's need for a distance education support center.

A. PURPOSE

Presently, we feel NPS does not have the infrastructure nor the resources to carry out distance education on a wide-scale. There has been only one department involved in distance education over the last year. Recently two departments have begun teaching courses via video teleconferencing. With this small number of participants the current distance education support staff has kept the program running. The support staff consists of an administrator, a collateral duty position, and a part-time technician, who resides in Michigan. The support staff does a good job; however, there have been times when classes have been delayed due to problems with equipment set-up. Sometimes equipment operation has left instructors disarrayed just before teaching class. Problems such as these could be minimized with readily available support personnel.

A fully implemented campus-wide distance education program will require a centralized distance education support center. We would like to model the support center after the current Total Quality Leadership (TQL) Office. The TQL Office provides support and assistance in implementing TQL throughout the School. The TQL Office shows commitment to the concept of TQL and promotes TQL use. NPS's Distance

Education Support Center could represent a similar commitment. The support center would provide:

- Training for professors on equipment and presentation techniques
- Updates on distance education technology and educational concerns
- Assistance in course organization and classroom preparations
- Maintenance and support of equipment
- Scheduling of classroom sessions
- Administering of the distance education program
- Coordinating with remote location (single NPS point of contact for distance education matters)
- Consulting on updates in equipment and additional requirements as program expands
- Reporting on trends, utilization, yearly cost, and expenses
- Collecting and distributing of lessons learned

B. RESEARCH

1. Current NPS DE Program Support

NPS's Distance Education Program support staff consists of an administrator, Mr. Tracy Hammond and a technician, Mr. Harry Thomas. Mr. Hammond is the Director of Instruction in the Office of the Registrar. Mr. Hammond's job places him in a neutral centralized position that allows all departments to freely communicate with him. Distance Education Administrator is a collateral duty for Mr. Hammond. He is always available for assistance in all areas concerning the NPS Distance Education Program. Mr. Hammond

schedules the use of the distance education classroom and assists in distant site coordination when required. Mr. Hammond has been the mainstay in keeping the program up and running.

Mr. Thomas is an expert in the field of video teleconferencing. He has done extensive research and work for the School in providing up-to-date video teleconferencing capabilities. Mr. Thomas is a part-time consultant for the School and resides in Michigan. He travels at the request of the School to distant sites as well as returning to NPS for maintenance and technical issues. He is always available via phone or video teleconference. Individuals involved with distance education have been very pleased with Mr. Thomas' dedication and performance.

We feel that Mr. Hammond and Mr. Thomas do an outstanding job at running the distance education program. However, because both positions are not full-time there are several support areas that are lacking. There is no formal training for use of the video teleconferencing equipment. Mr. Hammond and Mr. Dan Collins, Chairman of the Aeronautics and Astronautics Department, offer one-on-one assistance in running the equipment to individuals who request instruction. If there was a critical flaw in the equipment performance there is no on-site technical support. Lessons learned from one course to the next are not collected or passed on from department to department to improve on distance education presentation and performance. These are just a few of the many areas that a full-time support staff could improve upon. Additional areas are listed in the purpose of this chapter.

With a planned increase in NPS Distance Education Program the present support

structure would not be sufficient. During interviews with department chairmen, additional support was always a request. Coordination with the distant-site and instructional support were the major support requests. A support center for distance education would give chairmen, instructors, customers, and students a central point of contact for all issues dealing with distance education.

2. Presidio of Monterey DLI Video Teletraining

The Presidio of Monterey Defense Language Institute (DLI) has been conducting video teletraining (VTT) courses since 1990. (Lallos, 1995) VTT is a major component of the manner in which the DLI, supports its distance education mission to the field. Mr. Pete Lallos, Director of Operations, Plans and Programs at DLI attributes the success of the program to the outstanding instructors and the close monitoring and evaluation of the program by DLI supervisors.

DLI has 25 VTT studios stations (includes distant site studios) which they support and maintain. Presidio of Monterey has seven local studios where classes are conducted from five o'clock in the morning to seven o'clock in the evening to fit the distant sites' schedule. The only students that attend the session are at the distant site. To support DLI's program there is an administrator, Mr. Lallos, three full-time facilitators, one scheduler, and a computer administrator. (Lallos, 1995)

The facilitators are technicians who are familiar with the video teleconferencing equipment and classroom operations. Two facilitators cover a 14 day with over lapping shifts. The three facilitators rotate days on duty.

The facilitators perform all maintenance on equipment, the setup of equipment for

each class, and any troubleshooting required on down equipment. The facilitators, according to Mr. Lallos, reduce the instructor's involvement with the equipment, reduce the instructor's fears and concerns with using the equipment, and provide a reliable environment for instruction. Also, Mr. Lallos mentioned that by having the facilitators the instructors do not need to perform any additional duties outside of conducting a normal classroom session.

The scheduler schedules all classroom sessions and coordinates with the distant site for appropriate session times. The computer administrator performs all administrative duties associated with the program. The duties include registration of students, mailing of required course material, processing of completion certificates, and preparation of all other related administrative paperwork.

DLI's support staff illustrates our requirement for a distance education support center. Presently, DLI has 56 interactions a day via video teleconferencing. The support staff they have consists of three GS-7 to GS-9's, and two GS-9's. (Lallos, 1995) We estimate the administrator to be at the GS-12 level. NPS does not need a support staff as large as DLI's but with a growing distance education program NPS will definitely require a full-time program staff.

3. Chairmen's Concerns

During our interviews, department chairmen had questions about whom the point of contact for video teleconferencing was and where they could find more information on distance education. Many chairmen wanted to arrange a general overview lecture for their faculty on video teleconferencing and its present use at NPS. Chairmen's interest in

distance education is present but many do not know what is available to them. Chairmen also do not want to expend much of their resources and time researching how to use video teleconferencing equipment or how to establish a distance education course. The chairmen would like to have a centralized establishment to go to for answers and for support in their endeavors into the world of distance education.

Chairmen's concerns dealing with support and administrative issues depict the need for a distance education support center. Below is a summary of the support issues addressed by the chairmen. The administrative support issues directly follow the support issues. Figures 5.1 and 5.2 and Tables 5.1 and 5.2 further illustrate the strength of these issues.

a. A Central POC and Technician

Chairmen strongly feel there is a need for a full-time dedicated individual to assist all departments in issues dealing with video teleconferencing and distance education. A department representative would be able to liaison with this support individual on specific departmental issues. The central POC would be in charge of course scheduling, equipment operation, instructor training, distant-site setup (including initial setup and required course material setup), and lessons learned.

- *"If people want to learn about distance education have a central point where they can go to receive information."*
- *"I do not know what is available here at School and would like to know who to go to for information on distance education and the technology it supports"*

	Areas of Concerns	Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	POC and Technician	1				1		1	1	1	1	1			7
2	Unify School's Support Resources	1				1	1	1		1	1	1			7
3	Admiral/Provost Support Program	1		1						1	1		1	1	6
4	Resources For Program Restructure				1	1		1	1		1	1			6
5	Training On Equipment					1		1	1	1	1	1			6
6	Centralize Maintenance	1				1		1				1			4
7	Central Support Manning	1				1		1				1			4
8	Assurance Of Continued Support			1				1		1	1				4
		5	0	2	1	6	1	7	3	5	6	6	1	1	44

Table 5.1 Support

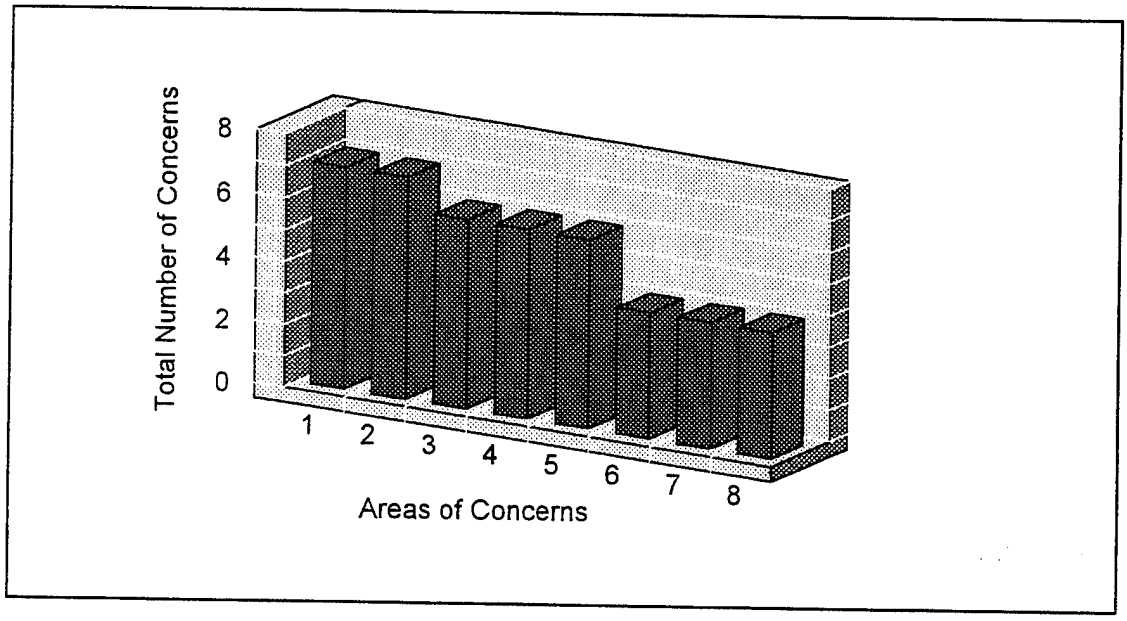

Figure 5.1 Support

Areas of Concerns		Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Faculty Preparation Requirements	1	1		1	1		1	1		1		1		8
2	Lab Problems		1		1	1		1	1	1					6
3	Priorities Other Than DL	1			1				1	1					4
4	Involves New Teaching Plan	1			1						1	1			4
		3	2	0	4	2	0	2	3	2	2	1	1	0	22

Table 5.2 Administrative

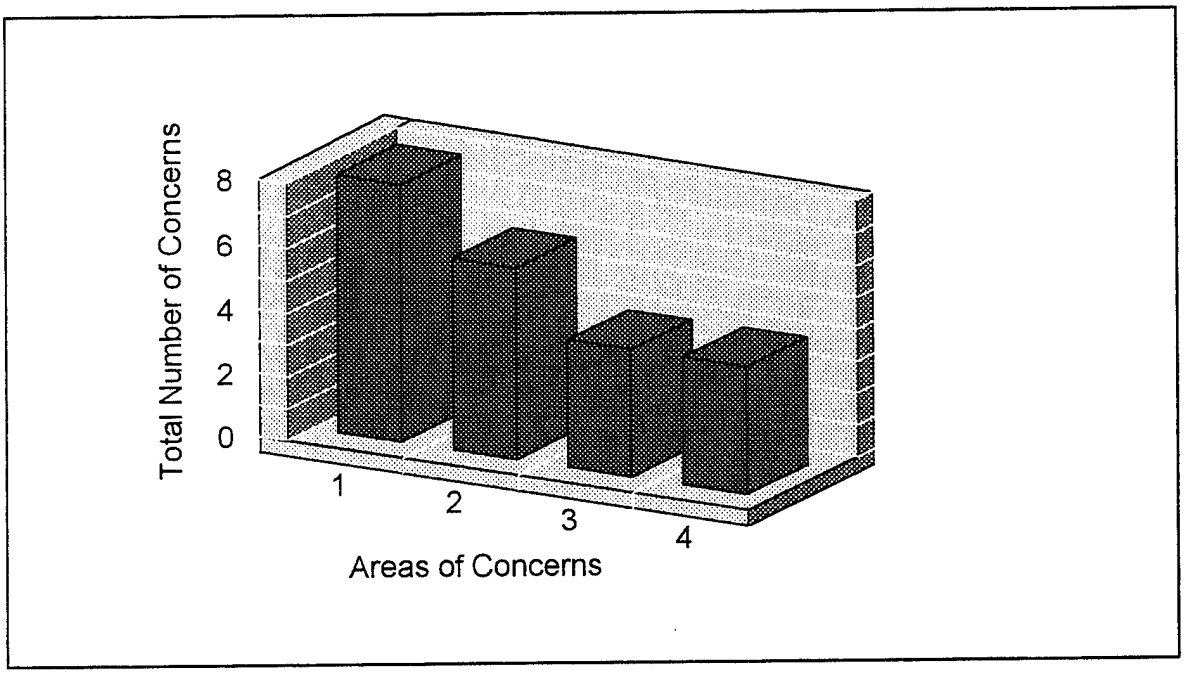

Figure 5.2 Administrative

Chairmen want personnel to help with the technical issues of a distance education. They want a dedicated person whom they can count on when the system goes down or when professors encounter equipment problems during class sessions. The chairmen foresee that this type of support will back up the professors who are hesitant to teach classes via video teleconference because of the technical requirements. With

technical support some chairmen feel the professors would make a better transition into teaching video teleconferencing classes. The chairmen would also like technical assistance in setting-up computer labs. Some chairmen question whether the technology and communication lines would support computer interaction.

- *"We need someone in the classroom to make sure it all works."*
- *"I do not fully understand what distance education technology is capable of doing. I think there will be problems with conducting our labs yet difficulties may be overcome with technology . . . need someone to consult with in this area."*
- *"If software and hardware do not work, who can come to the rescue?"*

b. Unify School's Support Resources

The chairmen voiced a concern over the funding of resources needed to support distance education. Seven out of thirteen chairmen would like to see NPS develop a centralized resource for distance education requirements. Some resources the chairmen would like covered by the School are the VTC technical support requirements, the room requirements (to include desks, equipment, and heating), and correspondence mailing requirements (to include course material to the distant site.) The chairmen want to reduce redundancies in cost and training.

- *"I have talked with appropriate personnel and suggested unifying the School's needs and resources. The School should reduce redundancies and effort in the distance education implementation."*
- *"Will the School cover indirect overhead for all curriculums?"*

c. *Admiral/Provost Support of Program*

Four of the department chairmen view NPS's support of distance education as just talk right now. Chairmen did feel that by setting up a distance education support center more departments would be willing to take part in distance education. The support center would show the chairmen NPS's higher echelon's dedication of resources and commitment to the program. The chairmen want assurance that this is not a passing fad.

- *"Distance education was in vogue a couple of years ago and some departments jumped on board, now other departments are standing back waiting to see how they do"*
- *"Pioneers are still seen as bald headed guys with arrows in their back."*

d. *Resources for Program Restructure*

With a support center staff covering the administrative issues of setting-up distance education courses, the faculty would use their time to structure lessons for video teleconferencing presentation. Chairmen feel the curriculum and some teaching styles will change to meet video teleconferencing presentation, which will require additional resources. Restructuring is not a problem for most curricula as long as there is support in the administrative and technical areas.

- *"The problem with our curriculum is that it is changing so fast, to keep up with the current world situation, all the time goes into updates vice devising new teaching plans which would be necessary for distance education."*
- *"We need resources for faculty to restructure source layout. We would have to restructure our curriculum . . . have to put all labs in the last two quarters to make a more efficient process that we are willing to do and have considered."*

- *"Faculty always involved in research and teaching . . . very difficult to find extra time to attack distance education teaching and class preparation."*

e. Training on Equipment

The personnel in the support center would have the expertise to show faculty how to run equipment and show them the equipment's potential (the "bells and whistles") to enhance presentations. Training in equipment operation would reduce the apprehension faculty have toward teaching via video teleconferencing. A better understanding of video teleconferencing technology would also assist the faculty in preparing lessons for distance education courses.

- *"Need to demonstrate distance education facility and technique to all faculty . . . present to all departments . . . have an individual from each department learn the ins and outs of the presentation equipment to present to their department."*
- *"Faculty concerned about how to do simulations, lectures and demonstrations via video teleconferencing."*
- *"I do not know if it would work which goes back to our lack of education"*

f. Centralize Maintenance

Centralized maintenance handled by the support center would help cut down on unnecessary redundancy in departments. Chairmen voiced similar concerns as expressed with unifying the School's support resources.

g. Central Support Manning

The department chairmen had great concern with the amount of time required in starting up a distance education program. The additional personnel time for

administrative support was a factor chairmen felt they could not support with their current manning. A centralized support center would reduce the requirement of each department having personnel dedicated to distance education support.

- *"Problems always occur when the rubber hits the road . . . money, manpower, . . . not enough faculty."*

h. Assurance of Continued Support

Four of the chairmen expressed the need for assurance of continual distance education support. A support center would show the School's commitment and offer continuous support to all departments.

- *"The School needs to get started . . . needs to get on the highway before distance education catches on campus-wide."*

i. Administrative Support

Administrative Support categorizes the concerns the chairmen voiced that we see the Administration being made aware of and supporting by allowing the departments to solve on their own. A centralized support center would alleviate the support concerns addressed above and the chairmen could focus on the distance education concerns within their departments. We feel that if distance education is going to take place each department will need to make some sacrifices and adjustments. The areas of concern in this category are:

- Implementation of lab sessions via video teleconferencing (with VTC technician assistance)

- Higher priorities within the academic departments
- Requirements for new teaching plans for video teleconference presentation of classroom material
- Requirement of additional time for faculty to prepare for a distance education course

C. REQUIREMENTS TO IMPLEMENT

1. Hiring Support Personnel

We suggest NPS hire a full-time Distance Education Administrator and a full-time VTC Technician. The Administrator would need an Administrative Assistant to help with clerical work and correspondence with distant-site, however, with a constraining budget this position may be filled on a part-time or collateral basis. This part-time or collateral basis would only be temporary until the distance education program grows or until the assistance is in great demand.

2. Facility

A designated location for the distance education support center on campus ideally would be in a neutral location where it would not be associated with any one department. With space at a premium around campus a neutral location is much easier said than done. Therefore, we suggest at this time any possible location be used for a support center.

The most logical selection of a room would be next to the established distance education classrooms in Root Hall. A support center next to the most used location for distance education would provide immediate response to a problem in the classroom. Adjacent rooms would allow technicians and support to be available at a moment's notice.

Keeping the distance education facilities in the same general location would also build upon the idea of a centralized NPS Distance Education Program.

D. BENEFITS

The benefits of implementation of a distance education support center are:

- Reduced equipment cost. Reduce redundancy in departments that will reduce the cost of equipment, support and maintenance.
- Centralized point of contact for NPS Distance Education questions internally and externally.
- Economy of scale savings in ordering materials, correspondence with distant-sites, and reduced man-hours.
- Continuous improvement. Efficiency in campus-wide scheduling, lessons learned and feedback.

VI. NPS DISTANCE EDUCATION MARKETING

In this chapter we will show what marketing can do to promote NPS's Distance Education Program. We will illustrate how marketing of distance education is not only needed external to the campus but also internal. We will suggest a marketing plan for NPS's Distance Education Program.

A. PURPOSE

Marketing NPS's Distance Education Program will serve to:

- Get department chairmen on board with distance education opportunities
- Reach academic sponsors for support and increased opportunities
- Understand the needs of each curriculum department and customer
- Identify and tailor department programs for distance education
- Publicize NPS Distance Education Program
- Gain DON (or even higher) support and funding
- Prepare an NPS Distance Education Homepage and Newsletter
- Identify locations of abundant commands/customers to deliver distance education
- Identify interested parties/customers to expand distance education service

B. RESEARCH

1. Dinosaurs in a Changing World

Conley (1993) says that the most striking observation one reaches about technology in education over the past dozen years is not its impact but its

> lack of impact. Informational technologies have been adapted in the central offices, but "technology has not revolutionized learning in the classroom, nor led to higher productivity in schools. While telecommunications may prove to be a powerful tool for restructuring, its use at this point is primarily to expand, not to change, the existing curriculum by offering courses such as Physics or French to schools not otherwise able to offer them and by employing traditional instructional strategies." Certain technologies have definitely found niches in education, but Smith and O'Day (1990) say that the technology of the last two decades has changed schools far less than it has the worlds of work, entertainment and communication. On the whole, they say, teachers have simply closed their classroom doors and gone right on teaching just as they were taught. (Portway, 1994)

Schools are not moving to integrate technology, nor are they keeping up with the latest developments; in fact, they are falling farther and farther behind as the equipment they purchased in the 1980's becomes obsolete and they are unable to purchase new equipment (Portway, 1994). Inside and out, schools today look very much the way they did a hundred years ago. Buildings are the same size, the classrooms have the same layout, and the delivery of instruction is basically the same. But the world has changed remarkably. Families are smaller, jobs are more technical, and entertainment has taken leaps and bound since the turn of the century. From inside a school, however, one would hardly know that visual images, rapid motion, technology and changes are pervasive in the world outside. (Portway, 1994)

Today, many schools look at using technology within their program such as adding a computer to their classroom. With higher education it may involve learning a new advanced computer program in conjunction with the proven "pencil method" or to research a new technological development through a standardized method. Information

technology, however, can go beyond the in-classroom application. (Portway, 1994)

With this decade's advances in information technology, students can travel outside the classroom without leaving their desks or their homes. Learning can be done through multiple media and using multiple forms of computerized learning techniques. Distance education is a step toward multimedia education. This concept of learning outside of the classroom is a concept that must be marketed. By marketing distance education and acknowledging advancing technologies NPS can be on the leading edge of education of the future.

2. Competition

Hundreds of thousands of students in schools, community colleges, and universities now take courses via one and two-way audio communication (Portway, 1994). Boise State University offers a master degree program conducted entirely over networked computers to students all over the country. The University of Phoenix offers an undergraduate and graduate degree in business. The California State University System has distance learning classrooms on each campus, which can be linked. The University of Missouri, St. Louis and St. Louis Community College offer over the Higher Education Channel (cable) courses that reach more than three million homes (Portway, 1994). These are only a handful of the many distance education opportunities available to officers in the armed forces. NPS has to market and expand its distance education program to be the one providing the fleet distance education. Distance education is being applied throughout education and NPS must get in on the competition.

The number of college and university students enrolled in distance education is in

the high six figures nationally (Portway, 1994). The types of distance education included interactive satellites (two-way video and audio), two-way audio hookups, prerecorded video telecourses, and computer and audioconferencing. Clearly, distance education is taking place world wide.

Perhaps one of the biggest reasons for the growth of distance education in higher education is the changing nature of work and society. Many students are working adults who have schedules that prevent taking full-time classes at regular time, or they live so far away from a college or university that they would have to move to attend school. Higher education is a demand of generations. (Portway, 1994)

Higher education institutions are out there effectively marketing their programs and expanding their customer base. NPS will be left behind unless they reach out and find out the needs of their customers and build up their distance education program. If NPS does not act soon, other institutions may fill the changing educational needs of the active duty officer.

3. A Marketing Plan

> We are convinced that in the 1990's, the companies that thrive and grow will provide not only excellent customer service; they will be monitoring that service *and* customers' satisfaction. Management will know what customers want and feel, and it will make whatever adjustments are necessary to satisfy them. (Clancy, 1993)

Organizations of the future are going to be those that thrive on changes and respond to them. In order to respond to these changes, organizations will need to understand the changes. Management in an organization will need to begin to look at changes that face their business. The world of education faces the same customer value

changes as the business world. More personalization and flexibility are what the customer values and what management must offer.

To adapt to change one must be aware that a change is taking place. Effective marketing management will help a business prepare for change. Questions a marketing manager might ask are:

- Are we aware of the changes in our business environment?
- How are we tracking those changes?
- How are the values that our customers and prospects hold changing? How will these changes affect their decision making as consumers and as business people buying business products and services?
- What do these changes mean for the way we do business? What have we done in our marketing planning to take account of the changing trends?
- How are these trends reflected in the marketing plans we are about to implement?
- What should we be doing differently in the future to cope with these changes? (Clancy, 1993)

NPS must ask these questions to assess its role in meeting the needs of the DON and in planning for the future delivery of graduate education. The marketing management questions can be a valuable tool for any NPS department. Once aware of marketing's ability, NPS can look toward developing a marketing plan.

A marketing plan at its most basic level defines a business's niche, summarizes its objective, and presents its strategies for attaining and monitoring those goals (Hedden, 1996). It is a road map for getting from point A to point B. But road maps need constant

updating to reflect the addition of new routes. (Hedden, 1996).

Today, with technology, international relations, and competitive landscape consistently changing, a marketing plan has to be continually reassessed. In fact "integrated" and "interactive" are the key words used to describe the business world's most successful marketing plans. "Interactive" refers to an open relationship between the business and the customers. The business tells the customer about itself and listens and acts upon their response. "Integrated" refers to the business's marketing consistently being reinforced by every department within the company. (Hedden, 1996)

The following is an example of a marketing plan NPS can use to begin marketing distance education. Figure 6.1 is a flow diagram of the marketing plan. (Hedden, 1996).

1. *Describe the Business* - The organization must first explain its purpose: to whom it delivers products or services, and what it delivers to those customers.

2. *Analysis the Market* - The organization must determine the target markets, the markets the organization competes in, and if there are new markets to exploit. The organization must also: seek customer knowledge of what goals customers have and what they place value on, identify the alternatives the customer has, know the competition, and describe the current environment.

3. *The Marketing Strategy* - This step is driven by everything done up to this point. The marketing strategy defines the approach the organization must take to market the organization. For example, if the organization is competing on the basis of service and support rather than price, the strategy may consist of emphasizing relationships. Then marketing tactics must be identified to support the strategies: market the organization vs. the product and assure the customer will be responsive.

4. *Marketing and Sales Organization* - This is the most frequently overlooked element in business. Yet, marketing and sales are what make everything possible. Determine what the future needs of the organization are and dedicate the people and positions to carrying out the important task of marketing.

5. *Revenue and Expense* - Explain what money the organization must dedicate to deliver the projected return. This will include staff wages and benefits for the organization, as well as the cost for specific marketing programs.

6. *Management Issues* - Marketings chance to let management know what might or could go wrong. Management becomes informed of short-term and long-term risks.

7. *Executive Summary* - A quick-look reference presented to management to include the organization's objectives, budget requirements, revenue projections, and critical management issues.

8. *Sell the plan* - Selling the organization's plan is as important as writing it. Otherwise, no one owns it, except the creators. The idea is to turn it into a rallying point that helps the organization move forward.

9. *Measure/Renew* - Once the organization's plan has been presented and people understand it, it needs to be continually worked out and information about it shared. The best way to help individuals see trends and respond appropriately is to have meaningful measures. In the language of Total Quality, these are the Key Result Indicators, the things that have importance to your customers and that are signals to your performance. Review the measure, share the information, and begin the process all over again. (Hedden, 1996)

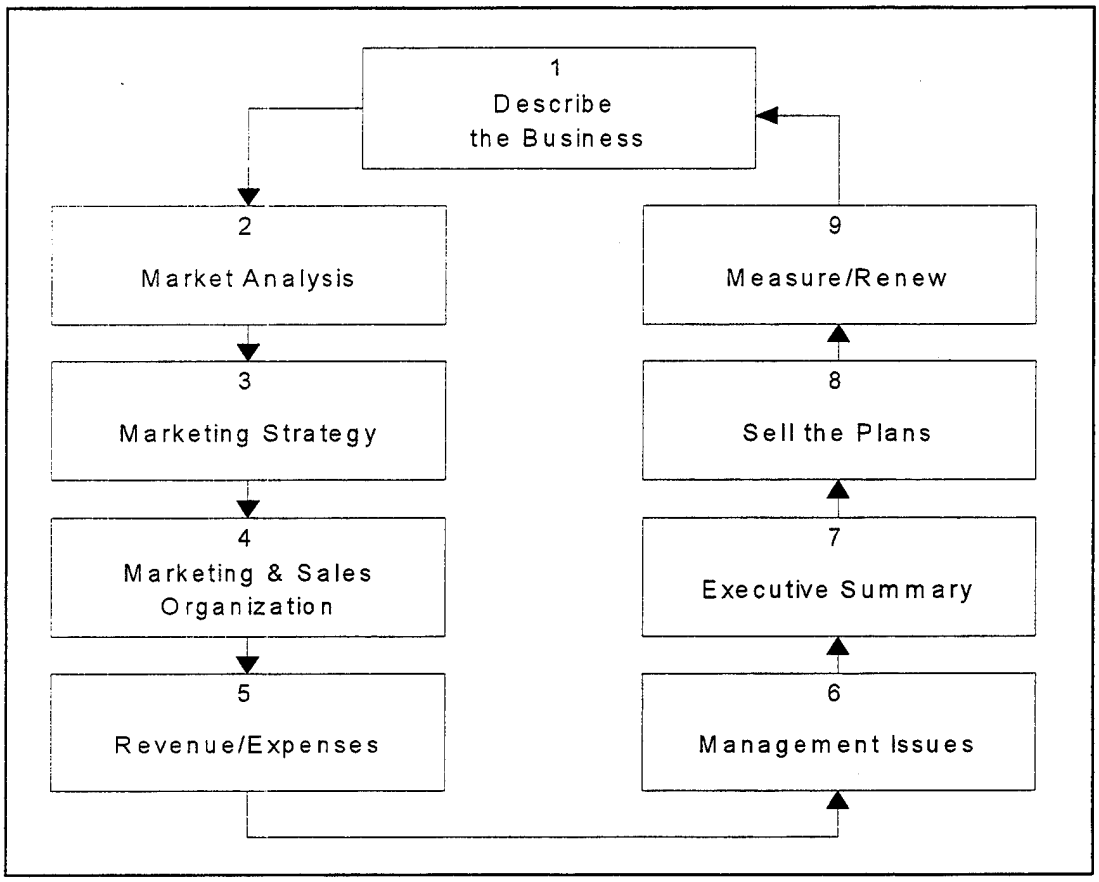

Figure 6.1. Flow Diagram of a Marketing Plan. From Ref. [Hedden, 1996]

The above plan is an extensive process, but it is one that spreads the word and spreads the ownership. A marketing plan process is the step that ensures that a plan will be constantly in use, and constantly at work for the organization. (Hedden, 1996)

4. Chairmen Concerns

Many of the chairmen we interviewed have specifically expressed the concern that they are not in the marketing business and they do not have the expertise to put together a marketing plan for distance education. Chairmen want a forum where they can have distant student opportunities identified for them. They also agree that Navy-wide

promotion of NPS Distance Education will increase the School's program. Most chairmen agree that marketing is also needed to sell the program to the higher levels of the DON to gain funding and support.

Some of the concerns expressed by the chairmen that a marketing plan would fulfill are:

- Gaining DON and academic sponsor support of distance education
- Identifying customers and customers needs
- Identifying academic sponsor requirements for distance education
- Identifying types of distance education programs most requested (i.e., full degree or partial degree)
- Identifying potential new customer base to include DOD civilian market
- Identifying how willing potential customers are to try distance education

Specific areas chairmen identified that would be supported by a marketing plan are listed in Table 6.1. Figure 6.2 illustrates the ranking of these areas.

	Areas of Concerns	Departments													
		A	B	C	D	E	F	G	H	I	J	K	L	M	Total
1	Need To Identify Customers	1		1		1		1	1	1	1	1			8
2	Unique/Customized Product	1	1		1	1		1		1	1			1	8
3	Sponsor Interest	1	1		1	1	1	1							6
4	Identified Potential Customers		1			1		1					1	1	5
5	Civilian Customer Market		1			1		1					1	1	5
6	Customers Acceptance Of Trials		1	1						1	1				4
7	Customer Commitment							1		1		1	1		4
8	School Marketing Plan										1			1	2
9	Identify Driving Forces									1					1
		3	5	2	2	5	1	6	1	5	4	2	3	4	43

Table 6.1 Customers Concerns Ranking

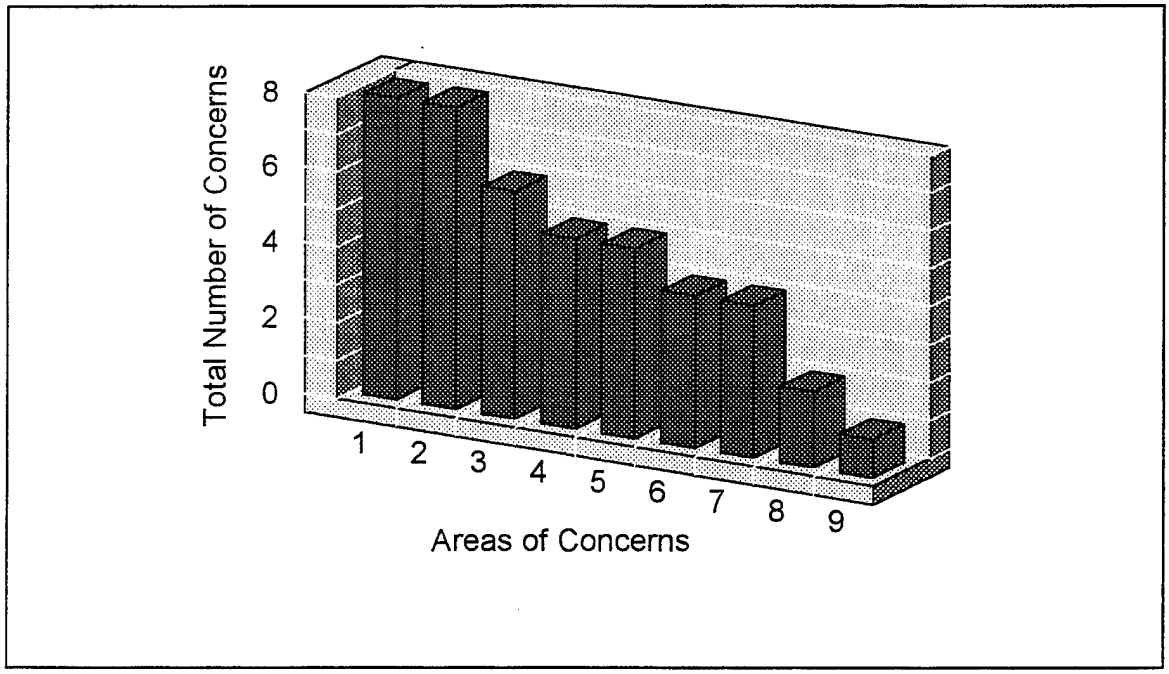

Figure 6.2 Customers Concerns

C. REQUIREMENTS TO IMPLEMENT

1. Identify Individuals for Marketing Program

NPS needs to identify people for marketing internally and externally that are specifically aware of the marketing needs of NPS's Distance Education Program. We suggest Mr Whipple and Mr Calhoon as two of the type of individuals that could be keys to head the marketing committee for the distance education program. These individuals are aware of what student markets are untapped, such as the aviation community, and NPS's admission requirements. They also have many connections inside and outside of NPS.

In addition to getting key personnel involved in marketing NPS can spread information about distance education through:

- **Homepage** Place information on the NPS Homepage on world wide web to help reach people who might be curious to know more about what NPS offers.
- **Newsletters** Send information to existing sponsors to inform them that there is an alternative to sending an individual to NPS for the entire time in residence for their graduate degree.
- **Lectures and Presentation** Present information to guests who visit NPS and to current students so they can get the word back to potential fleet students.
- **Videotape** Tape a sample class and send it back to Washington, D.C. to show an example of what is possible and create interest in distance education.

2. A Plan for Marketing Distance Education

During this era of budget cuts in DOD, NPS needs to prioritize programs. For instance, one of the key strategies is to expand to a new market via new technologies;

NPS will need to receive appropriate dollars to succeed. NPS needs to be able to show the payback on the investment in a marketing plan, and when the Navy will see a return on the investment.

A saying we have obtained through our research that summarizes our point for instituting a marketing plan for NPS is "If the dinosaurs had done an environmental analysis they would not be extinct." (Clancy, 1993) NPS needs to expand via distance education or it will gradually fade with other institutions that are unwilling to change and grow with technology.

D. BENEFITS

Marketing NPS's Distance Education Program will:

- Bring in more students.
- Increase NPS's student throughput.
- Assist in personalizing NPS's graduate education process to meet the customer's needs.
- Assist in finding willing customers, in key, large concentrated areas.
- Keep NPS in tune with the graduate educational needs of the Navy.

VII. FUNDING FOR NPS DISTANCE EDUCATION

In this chapter we show that there is a need for funds allocated from the DON to NPS for distance education. Funding from DON is difficult to obtain during a time of defense budget cutbacks. We suggest NPS with its current funds strengthen its distance education program to build a solid foundation and successful track to gain DON support and funding. In previous chapters we requested funding for the support center and marketing scheme, but ongoing operations and expenses will also require appropriate funding. Ongoing costs include:

- Capital costs, production equipment, and facilities
- Funds to cover the tuition costs of distance education students that is not accounted for in NPS's regular appropriation

We will present a costing model for distance education and discuss the cost effectiveness, feasibility, and justification for spending funds to educate students via distance education.

A. PURPOSE

A cost benefit analysis of a distance education program is difficult because of the subjective nature of some of the variables. There are many tangible cost elements that are easy to quantify, such as the deprecation of the hardware or the expense of broadcast time. However, it is more difficult projecting the long-term gains of intangible items such as the benefits of educating individuals who otherwise could not attend NPS. With an opportunity to attend NPS courses via distance education, an officer can also obtain a

Navy sub-speciality code which makes their education more valuable to the DON.

> Fletcher (1990) conducted research in response to congressional inquiry concerning the use of distance education within DOD. Indications of cost effectiveness only suggest rather than indicate conclusive relationships. None of the reviewed studies examine cost and suggest effectiveness in an empirical manner based on cost inputs and effectiveness outputs. One fact upon which all references agree is that distance education will initially be more expensive in development than conventional training, because computer hardware must be purchased and multimedia courses must be developed. During the delivery and maintenance phases, distance education training costs are considerably lower than conventional training, because savings are obtained in the following areas: travel costs, reduced instructors, administration, training materials, and equipment. When an entire life cycle is considered, distance education is more economical than conventional training. As more students use distance education, the cost becomes lower and lower (Bass, 1993). (Portway, 1994)

B. RESEARCH

1. DOD Funding for DE

Mr. G. A. Redding, Director of Distance Learning from the National Institute of Standards and Technology (NIST), has said that most cost analyses in DOD have been flawed because one can only save what money is available to spend (Biggs, 1994). For example, if there was an approved language training budget of $500,000, and video teletraining trained "X" students using only $400,000, then there was a savings of $100,000 (Biggs, 1994). If there was no approved training budget for distance education, then there can be no savings recorded. In the latter case, training funds were provided from funding approved under another budget. This is why actual costing becomes so difficult. (Biggs, 1994)

> Rarely are economic data (i.e., direct and indirect dollar costs and benefits) analyzed before conclusions are drawn about the positive aspects of distance education (Hackman & Oldham, 1975). It is difficult to convert potential users to a new technological vision when the benefits are difficult to quantify. Traditionally it takes seven years to begin receiving returns on technological investments. This delay causes investors to balk. Future investment is a risk. The key is to prepare a strategy that provides for short term reviews of a long term plan. This plan should promise investors at least a logical rationale for some return on their investment. The idea is to reevaluate distance education investments in incremental (short-term) periods. Most distance education users have a hard time measuring economic success (Redding, personal communication, 1994). Success can mean increasing student throughput, establishing connectivity between students and learning resources, taking advantage of remote subject matter experts, and sometimes saving money. (Biggs, 1994)

Some individuals have suggested to us that NPS needs to look at distance education as a military investment. This can be compared to the cost of a missile development and acquisition: the missile system is procured because it is needed, not because of its initial cost. Many individuals we have talked with feel that distance education is necessary and the long-term gain is what the School (and DON) should be focusing on. We believe that a graduate education will benefit the Officer Corp and the DON.

2. TRADOC Findings

Christopher H. Biggs, in his NPS thesis (1994), presents an example of cost and benefits associated with distance education as compared to other forms of instruction. His example is from the Army's videoteletraining program.

The Training Development and Analysis Directorate (TRADOC) was given the mission to develop a training program to reduce the time soldiers spend in resident training (Wilson, 1992). As of 1992, over 32,5000 students have graduated from the Army Logistics Management Courses (ALMC) and TRADOC Teletraining Network (TNET) conducted via VTT. Using this population, a cost model of the three most expensive teaching styles (resident, VTT, and mobile training team) was constructed. The model includes instructor salaries, facilitator salaries (VTT only), equipment costs, prorated and shared overhead operations, and temporary additional duty (TAD) costs. Wilson says, that costs were based on a training year of 245 class days. (Biggs, 1994)

Table 7.1 shows the resulting average expenses per student.

TEACHING STYLE	DOLLAR COST/STUDENT
Resident Instruction	$48,647
VTT	$22,310
Mobile Training Teams	$19,190

Table 7.1 Average Training Costs per Student. From Ref. [Biggs, 1994]

Student travel and per diem costs escalated the resident instruction total of $48,647. Mobile training team instruction required teachers to travel to remote student sites and teach resident courses. A school must have enough instructors to send qualified teachers on the road to make this option practical. The remote site must also be able to provide required facilities for instruction. With these caveats in mind, VTT offers a viable training option. (Biggs, 1994)

Furthermore, Wilson (1992) states that VTT also offers other non-tangible benefits. The emerging results add to the evidence that video teletraining can be an effective medium to replace resident training. Some of his conclusions are:

- VTT is popular with both instructors and students.
- Students learn at least as well or better than resident students.

- Courses can be quickly adapted to mission requirements.
- VTT helps to standardize training.
- VTT increases availability of service members to parent commands (Biggs, 1994)

This example obviously can be carried through to apply to Navy distance education.

3. Chairmen Concerns

The chairmen concerns expressed throughout the previous chapters all hint in one way or another that funding is a root concern. With more funding chairmen can elevate many of their other concerns. For example, chairmen could begin their own distance education program with their academic sponsor and assign more instructors to teach the various required distance education course. As one chairmen put it,

- *Everyone is interested in a distance education program. The problem is when the rubber hits the road, money and manpower fall short.*

We found that each academic department chairmen sees this School as a business where everything is a compromise. The chairmen's fear is that if they want distance education then they have to make it fit into the constraints. Chairmen feel that to fit into established funding constraints they would have to cut back in other departmental areas, which at this time they have no latitude to do. They also see it as sacrificing the quality of the distance education program they would want to produce.

With no leeway in their department budget, the chairmen are concerned that they

will not receive the necessary increase in resources from the School's budget to continue a distance education program. One reason the chairmen need the additional resources is for their faculty to restructure courses for distance education. The chairmen feel that they have a first-class faculty with first-class structured programs, and they do not want to turn their programs into a factory. The entire educational realm of each department wants to continue to provide a quality product to their customer.

Additional specific concerns chairmen addressed that would require them to receive additional funding are the following:

- Monetary Incentive- Some of the chairmen feel ideally they have a few professors who will teach distance education courses because they feel it is the way of the future but most feel they will have to offer additional monetary incentives for their faculty to motivate them in the initial start-up of distance education.

- Additional Time- Initially there will have to be additional time allocated to present the whole concept of distance education to the professors in each department. One chairmen stated "This is an introduction of a very drastic concept and needs to be treated as such." Additional time may be required for restructuring, preparation, and practicing of a distance education course.

- Training- Chairmen expressed the need to train professors in distance education teaching techniques, to include camera use, overhead presentation, and addressing the class. Chairmen are concerned that there is a vast difference between traditional methods of teaching and distance education.

4. Cost of DE at NPS

The costs associated with distance education must be estimated based on the data that is available from those in industry, government, and academia who have been using distance education successfully for many years. The variables and parameters we used in

our generic model to estimate distance education costs are initial assumptions based on industry practice.

There is currently a lack of industry standards for how to calculate costs for distance education. NPS also does not have a standardized method. The generic model is an attempt to generalize the cost of distance education at NPS to begin a centralized method to structuring NPS's Distance Education Program.

a. Generic Model Start-up Costs

The start-up costs for distance education courses are mainly for the course development and equipment. These fixed costs are amortized over four years, which is the estimated life of the equipment. The generic cost model includes the following cost:

- NPS VTC equipment costs $45,000 per classroom unit. The VTC equipment is assumed to run ten hours per day, two hours per class, with five courses taught per day. There will therefore be ten courses per quarter, four quarters per year, when teaching Monday thru Thursday with Friday available for office hours. The cost of equipment is equally distributed over all the courses assumed to be taught via VTC.

- VTC equipment for the distance site may be a possible NPS expense with initial start-up of a DON wide program. We assume that the distant site takes one course per quarter with four quarters per year for four years and distribute the costing in the same manner as above.

- Telephone service is fixed at $120 per month for the rental of one ISDN line and the site connections. The VTC equipment needs three ISDN lines to run at full capacity. The VTC equipment is assumed to be used for the same number of classes as outlined in the first point above. The fixed cost of the rental lines is equally distributed over all the courses assumed to be taught via VTC.

- Room condition (costs associated with preparing room to be suitable for a distance education classroom) is assumed to be $3000 per room. This is based on the cost to equip the rooms in Root Hall at NPS. The room is assumed to be used for the same number of VTC classes as the points above. The cost of

reconditioning the room is spread over all the courses assumed to be taught via VTC.

- Course preparations conversion start-up costs of $2,165 per course. This is an estimated amount of having to prepare overheads, reconstruct material for VTC presentation, and other various needs the instructor may be required to do for each course taught VTC. This cost will vary greatly per instructor, per department, and over time. The more VTC courses are taught the course preparation should become reduced.

- Instructor Training would be $2,500 per instructor. Again this is an estimated amount. The amount includes salary cost of the time the instructor will require to learn how to use the VTC and the technician or VTC instructor cost of showing the individual how to operate the equipment.

b. Generic Ongoing Costs

The ongoing costs are the variable cost associated with conducting the distance education course. The generic cost model includes the following variable costs:

- Instructor salary and assistant will be assumed to teach two courses per quarter and teach three quarters per year.

- Technical assistant is one half of the instructor's salary.

- A proctor at the distant-site (if needed) is $20 per hour for 20 hours.

- Telephone service variable is $50 per hour per course and assumes 55 hours per course, which includes a 10% consulting cost fee.

- Administration support is composed of three GS-7's at $38,000 per year with 40 courses per year.

- Software and books for far-end students are $125 per course per Navy student, which is based on the current Navy book allowance in practice at NPS.

- Mailing costs of tests and handouts are estimated to be $436 per course.

Total costs are the summation of the amortization costs added to the

ongoing variable costs divided by total number of students. The result is the cost of educating a distance education student.

The average cost of a resident student at NPS is $85,000 per year (Jay, 1995.) An average resident student takes 16 classes per year; therefore the cost per course is $5312. The cost for a distance education according to our generic model is $1467 or less then a third of the cost of a full-time NPS resident student course.

The money needed to set up a distant education site can almost be justified with only two students utilizing the equipment meant for an entire class. One student could theoretically attend for the first two years and the second student the next consecutive two years. Both students would cut their residency at NPS by one year total, which saves the Navy $85,000 dollars. This example takes into account the money saved by having both students in residence at NPS for only 12 months instead of 18 months. This does not take into account the intangible benefit the Navy would realize by having the student fulfill two billets (student and operational) while beginning his or her's graduate education via VTC. This example also does not take into account the benefits that both the individual and the DON would gain by keeping the individual in a full-time job and within their Naval community for a longer period of time.

Table 8.2 is a spreadsheet that displays the generic model we developed in comparison to the current models being used by the Aerospace and Aeronautics (Aero) and the Computer Science and Electrical Engineering (CS) Distance Education Programs. We have also included the proposed Systems Management Department (Sys MN) costing model that will be used if the HSL-41 Pilot Program (Chapter VIII) is implemented. We

believe our model to be more detailed and complete than the currently used models. Our model was developed to show what costs associated with distance education need to be accounted for and funded.

Start-up Costs for Course and Equipment	Generic	CS	Aero	Sys MN
VTC Equipment NPS (1)	281	2813	2813	281
VTC Equipment Distant Site	2813	0	0	2813
ISDN Service(Fixed for Rental of Lines and Connections)	388	0	0	388
Room Construction Preparations	188	0	0	0
Course Conversion Costs (2)	2165	0	1600	0
DL Instructor Training Costs (3)	2500	0	4063	2500
Total Fixed Costs per Course	8334	2813	8475	5982
On-Going Costs for People and Resources				
Instructor Salary (4) and (5)	14167	17500	7969	17500
Proctor at Distant Site	400	0	0	0
Telephone Service Variable Costs (6)	3025	3025	3025	3025
Technical Assistant Salary (7)	2850	0	3984	0
Software Costs and Books for Distant Site	125	10000	0	0
Mailing Costs of Tests, and Handouts	436	0	0	0
Travel Costs (8)	0	0	1963	1000
Total Costs	**21003**	**30525**	**16941**	**21525**
Number of Students	**20**	**20**	**20**	**20**
Average Costs Per Student	**1467**	**1667**	**1271**	**1375**

(1) VTC equipment cost for NPS $45,000 per 16 courses over four years, four courses per year for Aero and CS model.
(2) Course conversion costs for development costs $25,600 for Aero model.
(3) DE instructor training costs and technical support $65,000 per 16 courses for Aero model.
(4) Instructor salary $15,000 plus $500 per student over 15 students for CS model.
(5) Instructor salary $85,000 times 1.5 per 16 courses for Aero model.
(6) Telephone service variable costs per quarter for 55 hours at $50 per hour plus 10 percent consulting fee.
(7) Technical assistant salary one half of a professor's salary for Aero model.
(8) Travel costs $31,400 per 16 courses for Aero model.

Table 8.2 Spreadsheet of Distance Education Costs Models

C. REQUIREMENTS TO IMPLEMENT

Our recommendation to gain more funding from DON for distance education is to set up a cost committee to look further into the costs of a distance education program. Outlining the costs and benefits is a means to better justify the spending of the funds to implement the distance education program. Funding is the bottom line.

NPS should begin a successful program and with a throughly done cost study can build a case that DON cannot turn down. With a strongly implemented distance education program and sound benefits for DON, NPS should gain more funding for distance education. Through initial efforts success in the fleet will be seen and requested by more and more commands, which should reach higher echelons and individuals with strong influence on funding allocation. This additional path of funding can only help in NPS's individual request for funding.

D. BENEFITS

NPS needs to build a case to the DON to gain funding for a distance education program if it is to reach its future customers (the officer whose operational service to the fleet is in demand.) The DOD in its downsizing has left fewer people to do more. If NPS does not find a way to personalize and provide a graduate education to the active duty military officer, other institutions will. In an environment of downsizing and budget cuts, distance education as a alternative to a full resident graduate program will increase.

VIII. CASE STUDY: PILOT PROGRAM WITH HSL-41

In this chapter we will present an opportunity for NPS to develop a distance education program with an Naval Active Duty Component, Helicopter Squadron Light (HSL-41) Light Airborne Multipurpose System (LAMPS). This program would be a pilot program for the type of graduate program that we feel would best suit the needs of the active duty naval officer and DON. The requirements and benefits of this type of program are also presented.

A. PURPOSE

How do we structure a graduate program that meets the learning needs of today's naval officer, but also fits their professional, personal, and time constraints? The program would also need to accommodate the needs of the DON. The answer is distance education.

B. RESEARCH

1. Customization

Throughout our research we held many discussions with Dr. Ted Lewis, Chairman of the Computer Science Department, examining the current world of technology and how the role of distance education would enter into this rapidly changing world of technology. In one of our discussions about education of the future we assessed that the younger generation is not as concerned as the older generation with the label attached to an item; it is more concerned with quality of the product. For example, Professor Lewis mentioned that studies have shown that the younger generation is more concerned with what kind of

soup is in the can and not whether it is Campbell's soup like our mothers did.

"Branding," as shown in the example above, will become less and less important to future generations. In our context, we see younger generations being more concerned with the quality of education and the convenience in receiving that education than in who is providing or where they are receiving the education. For instance, if an individual is teaching thermodynamics out of a garage for a hundred dollars a course at convenient times and an interested individual can get credit for the class, then the individual will take that option over a professor teaching from MIT at inconvenient times.

From the perspective of Dr. Lewis, institutions still hanging on to their "brand name" thinking that their name in itself will be enough to attract students will be left behind. In accordance with Davidson's Law, institutions need to be aware that in order to survive in the future, "they will need to eat their lunch or someone else will." (Lewis, 1995) This expression comes from the business world which says if you do not make yourself obsolete someone else will. The bottom line is that in the information revolution, customers not only want efficient mass production, but they also want personalization. Distance education provides personalization.

A Distance Education Program is the way of the future in education because it can be personalized to meet the customers needs. NPS must become aware that this will attract the students of the future; if NPS does not keep up with the change, then it will become obsolete. NPS's customers of the future in this downsizing DOD are required to do more with less. They will demand to be taught anything, anytime, anywhere.

2. Present Distance Education Scope

NPS's Distance Education program is outlined in Appendix A. NPS's current customer base is primarily DOD civilian employees. The current programs do not provide any refresher classes and are specifically targeted at individuals who are working in specific engineering areas and in the industry labs.

From our observations, these programs have proven to be too ambitious even for the students emersed in the technology in which they are studying. For example, the Aeronautics Department started out with 24 students in July 1994; one year later they were left with only 6 of the originally 24 students. We feel the high attrition is due to the difficult nature of the full-degree program coupled with the lack of civilian motivation to complete the program. Active duty naval officers who are motivated to a career in the military would have a high motivation to obtain a master's degree in a naval sub-specialty related field. Also, the program we propose would not be a full degree program but rather a partial degree program. The first year requirements for a master's degree would be completed via distance education, with the final six months to a year completed in residential classes at NPS.

The typical naval officer that comes to the NPS does not have the required undergraduate degree for the graduate degree he or she is studying while in residence at NPS. The student is given the opportunity to take the required undergraduate courses in order to have the tools to complete the graduate level requirements. The current Distance Education Program at NPS takes three years with no refresher courses for the distance learning students.

We feel that the present distance education programs are limited in scope and NPS must offer more diversity to satisfy customers needs. Programs with more breath will better suit the people out in the fleet. An example program would be from the Systems Management Department. The Systems Management Department has over eight degree programs that require the same initial eight or more course. This future distance education program that we and the Systems Management Department Chairman, Dr. Reuben Harris, envision will meet a wide range of customer needs, not only for this pilot program with HSL-41 but other DON institutions.

3. HSL-41 DE Program Support

HSL-41 is a LAMPS Mark-III squadron and is part of a complete weapon (ship/air) system designed to maintain part of our national defense program: to keep sea lanes open, and to protect high value military and commercial ships during a major conflict.

LAMPS is the acronym for light airborne multipurpose system. The SH-60B helicopter is configured specifically in response to the LAMPS requirement of the U.S. Navy. The LAMPS MK III system has been designed to the Navy's sea control mission. In fulfilling the mission, LAMPS MK III will encounter a threat that has many dimensions. The threat encompasses a hostile submarine fleet and missile-equipped surface ships. The system extends the search and attack capabilities of LAMPS MK III configured destroyer, frigate, and cruiser platforms, deploying helicopters directly from these ships. (Bush, 1995)

The Commanding Officer of HSL-41, Commander Gary Hall, his Executive

Officer, Commander Marty Keaney, and their boss the Functional Wing Commander, Captain Marion, an NPS Alumnus, are very enthusiastic about the potential this type of program could have Navy wide. They all agree that "NPS programs are uniquely designed to meet current and future needs of the DOD in advanced military technology and operational capability." As Commander Hall stated, "allowing his instructors the opportunity to stay in the cockpit while working on a 'worthwhile' graduate degree will make a competitive group of people even more competitive."

There is enthusiastic top-level support in taking part in this pilot program. When the potential students in HSL-41 were asked if they would be interested in taking part in this pilot program, 29 out of the 30 instructors said they would begin distance education if it were made available to them. The individuals that are currently attempting graduate work are forced to attend schools that will not qualify them for a Naval sub-specialty code. By NPS reaching out to meet their needs with distance education, they will not only receive a premier graduate education that is fully funded but they will also be more competitive because of their sub-speciality code for jobs further along in their careers.

4. Chairmen Concerns

Successful implementation of this pilot program would help the chairmen of the departments at NPS see the success and opportunities available in reaching out to students in the active duty military. It would also address some of areas of concern the chairmen have such as:

a. Sponsor Interest

Some chairmen have said that sponsors and departments are going to have

to see high potential for payoff before people get on board with the concept of distance education. By successful implementation of this pilot program, sponsors will begin to realize the benefit of having individuals in the fleet and attending school. The individual will save money by filling two billets at one time. The sponsors will also benefit by having a more productive thesis topics because the individual will be in the fleet longer and thinking about how to apply their education to solve problems their communities are experiencing in real time.

b. Need to Identify Customers

This program will be in one of the Navy's largest center of mass of personnel. There is a wide spectrums of potential customers represented in San Diego, from submariners, surface, aviation, and the Marine Corps. By publicizing this in base and local papers, not only will others be made aware of what NPS can offer but they can also contact HSL-41 and possibly receive demonstrations.

c. Customer Acceptance of Trials

HSL-41 is fully aware that this is a first for NPS and there will be problems in the future that we will have to work through them together. This is also a solution for the aviation community which have historically not filled its quotas at NPS. The current CNO is demanding that the quotas be filled in the future.

C. REQUIREMENTS TO IMPLEMENT

1. The Proposed Program

NPS must take this opportunity to begin marketing and spreading the word throughout the active duty military that NPS has distance education capabilities. The

Aviation community is a close knit group and would be a dynamic beginning for future distance education opportunities. NPS would be visible in the fleet as a distance education provider.

The program NPS should begin with HSL-41 would be focused on the needs of the active duty line officer and offer a Financial Management, Manpower and Personnel curriculum program. The program would begin with distance education for 24 months then continue with resident time at NPS. This program would reduce the time an aviator would have to spend 'outside' of his community. The HSL-41 pilot program would also illustrate the value of doing more with less in that it would allow officers the opportunity to begin a significant naval graduate education program while they are still serving time in the fleet.

Our proposed program would include:

- Offering the first eight classes that everyone needs to take in System Management
- One class per quarter for 24 months, requiring individuals to come to NPS for 12 months instead of 18 months.
- Students required to attend class three to five hours a week.

This program would be implemented in an area with a high concentration of military active duty members. HSL-41 is only one squadron of the many commands located in San Diego that could all be potential customers. Therefore, a large number of students to support such a program would always be available. Another plus to this location is that additional commands will see the benefits of this program, increasing

NPS's customer base.

The more visibility NPS can obtain from this program the greater the follow-on opportunities not to mention the increase in the amount of discussion about 'Naval distance education' that will reach the higher echelons. The more the higher levels of the DON hear about distance education, the opportunities it brings, and the success the carries, the more funding they may place in the direction of distance education.

Therefore, we propose NPS and HSL-41 initially fund the pilot program to gain distance education support Navy-wide. The target market for the pilot program would be the instructors at HSL-41 who are assigned to the squadron from anywhere from 24 to 36 months. These instructors are the individuals responsible for training pilots who are returning to a flight status. These pilots who are being trained would also be a source for spreading the word about NPS's Distance Education Program.

Currently only six of the 30 instructors stationed at HSL-41 are pursuing a graduate degree. With NPS's program the six would at least double if not triple. This distance education opportunity to have more officers in the fleet with a graduate education are good odds for the Navy.

Not only would there be an increase in the number of officers with graduate education but there would also be a costs savings to the DON. The composite cost to the DON to send a student to NPS in a residential program is $85,000 per year (Jay, 1995.) By shorting the resident time at NPS by six months for just one student would be a saving of $42,500, which would almost pay the cost of the VTC equipment ($45-50,000) in the classroom at HSL-41.

This only takes into account the money saved by not having officers in a student residential status for only 12 months instead of 18 months. This does not take into account the intangible benefits the Navy would realize by having the student filling two billets, distance education and a job in the fleet. This study also does not take into account the benefits that individuals would gain by keeping a person in his or her community for a longer time and applying the education to real-time issues in the Navy.

2. Funding

NPS, in conjunction with HSL-41, needs to identify the funds to begin educating active duty naval officers via distance education. The funds needed for the HSL-41 Pilot Program include:

a. Fixed Costs

- VTC equipment ($45-$50,000, to be installed in an HSL-41 squadron classroom)
- Telephone line installation ($450 for three ISDN lines)

b. Variable Costs

- Instructor salary ($20,000 average salary for 20 students, will vary with instructor)
- Telephone bills ($50 per hour for use of the three required ISDN lines)
- Support costs such as mailing tests, and office hours via VTC (various cost amounts)

Chapter VIII provides more details into the funding requirements for this pilot program.

D. BENEFITS

The benefits of a pilot program include:

- Increase the number of NPS filled quotas
- Reduce the time an officer spends as a resident student and removed from operational service
- A DON cost savings by having the student accomplish an educational objective plus a full-time job
- A DON cost savings in the dollar amount required to educate an officer
- Provide officers flexibility in their career path
- Introduce more graduate opportunities to the DON
- Increase NPS's mission and value to the DON

This recommendation looks upon the investment in a distance education program at NPS as a military investment where the emphasis is on long-term gain not short-term money saved. Part of the NPS's distance educational goal should be to reduce the amount of time a student spends away from an operational Naval billet.

The HSL-41 Pilot Program is a superior opportunity. With a committed customer (HSL-41), enthusiastic players (active duty officers), willing instructors and department (Systems Management Department), this program is bound to be a success and an example of what is possible Navy-wide. NPS and aviation supporters must fund this initial program to set the future distance education for DON. NPS will become the Navy's "Distance Education University."

IX. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

NPS must promote its distance education program both on and off campus. A successful distance education program which has top-level support will promote graduate education throughout the DON and will effectively establish a well-educated corps of officers to lead the Navy into the challenges of the future. The following recommendations to advance the NPS Distance Education Program must be done:

1. Develop a mission and vision statement for NPS Distance Education.

2. Stand-up a centralized distance education support center.

3. Develop a NPS Marketing Plan for distance education.

4. Obtain funding to support distance education throughout the DON.

5. Set up a pilot distance education program with an active duty component, HSL-41.

Implementation of these recommendations should begin now. If these actions were to be executed today, a time line for initial completion would be:

1. Two weeks- A developed NPS Distance Education Mission and Vision Statement.

2. One month- A centralized NPS Distance Education Support Center on campus. (The support center will be initially manned by present distance education support personnel with additional required personnel added when funding becomes available.)

3. Two months- A written strategic NPS Distance Education Marketing Plan.

(The plan will be carried out over time as established by the group that develops the plan.)

4. Three months- A Systems Management Distance Education Program with the active duty component, HSL-41, to be funded by NPS and HSL-41 to initiate the success of NPS's Distance Education Program.

5. An undeterminable amount of time before funding obtained from the DON. Every possible effort should be expended to reach the top-levels of the DON in gaining support and funding of this program. The actions implemented above will bring notice and credit to NPS as seeking out ways to provide education, which at sometime will reach the right people and push the right 'buttons' in beginning required initial funding of Navy-wide Distance Education.

NPS must act now. The world of today is rapidly changing with advances in technology. Individuals are demanding education that meets their personal needs. Technology allows traditional universities and institutions to meet the needs of their customers. Many of these changing universities may soon also meet the needs of NPS's customers. If NPS does not begin to adapt and adapt rapidly it may become the next generation dinosaur.

In closing, William Massey and Robert Zemsky put the situation NPS finds itself in into perspective in the following quotation:

> IT will change teaching and learning profoundly, no matter what the response of traditional higher education institutions. Just as the development of the printing press forever changed the teaching enterprise, IT represents a fundamental change in the basic technology of teaching and learning. The transformation will take a long time, long enough for critics to claim that perhaps higher education can thrive without fundamentally changing itself in response to the new technology. If traditional colleges and universities do not exploit the new technologies, other nontraditional providers of education will be quick to do so. (Massy, 1995)

B. RECOMMENDATIONS

In addition to implementing the actions outline above, we recommend the following areas be further researched to improve the success of NPS's Distance Education Program:

1. Track HSL-41 Pilot Program - Track HSL-41 Pilot Program and report lessons learned. Lessons learned should be obtained from the customers, instructor, administrators, and academic department.

2. Identify Customers - Identify commands that have VTC capabilities and locate areas with large numbers of junior officers where VTC could be installed for distance education.

3. Determine Funding Requirements - Determine actual required funding to expand distance education Navy-wide and maintain the program over a period of ten years.

4. Identify DOD VTC Training Programs - Identify current DOD VTC training programs that NPS could piggyback on with distance education.

5. Obtain Funding - Identify sources for funding and develop a proposal to justify funding requests that can be presented to the identified sources.

6. Revise NPS student throughput - Revise NPS student throughput and academic quotas to reflect distant students. Determine a feasible throughput of distant students and resident students over a ten year period.

7. Define faculty concerns - Define NPS faculty concerns with teaching distance education courses and ways to overcome those concerns.

8. Define a marketing plan - Define a detailed marketing plan for NPS's Distance Education Program. Develop a proposed marketing scheme, homepage, and newsletter.

APPENDIX A. NPS DISTANCE EDUCATION PROGRAM AND VIDEO TELECONFERENCING SYSTEM

A. NPS DISTANCE EDUCATION PROGRAM

The overall mission of NPS is to provide graduate education, master and doctorate level, to qualifying members of the armed forces, to assist in the support and defense of the United States. NPS Distance Education Program assists in accomplishing this mission by providing off campus education to individuals. Distance education provides people, who could otherwise not attend NPS, the opportunity to receive a graduate education. The NPS Distance Education Program offers full-degree programs in Aeronautics or Astronautics and Electrical and Computer Engineering to Naval Aviation Command (NAVAIR) in Washington, D.C. and Naval Research and Development (NRaD) in San Diego, California.

1. Full Degree Programs Offered

The Naval Postgraduate School Distance Learning Programs Leaflet has the following description of the full degree programs NPS offers.

a. Aeronautics or Astronautic Program

The distance learning program for the Department of Aeronautical & Astronautics is specifically tailored for users and managers of military aircraft and new weapon programs. Students having a Bachelor of Science in Aeronautical or Astronautical Engineering or equivalent can complete the program in their spare time in three years by taking a total of 12 quarter-length courses, nine of which are lecture

courses taught at NPS and televised to the distant site, and three "thesis courses." The student will take three quarters (nine months) to complete a thesis. The thesis topic will be selected from seven technical areas offered by the department. The courses offered in this program are listed below:

First Year			
Quarter	1	AA4632	Mathematical Method for CFD
	2	AA3451	Aircraft & Missile Propulsion
	3	AA4431	Turbomachines-Analysis & Designs
	4	AA4452	Aircraft Engine Design
Second Year			
Quarter	1	MA3232	Numerical Analysis
		OS3104	Statistics for Science & Engineering
	2	AA3101	Flight Vehicle Structural Analysis
		AA3501	Current Aerodynamic Analysis
	3	AA3202	Structural Failure, Fracture & Fatigue
		AA4318	Aeroelasticity
	4	AA4103	Mechanics of Composite Materials
		AA4502	High-Speed Aerodynamics

The Controls & System Design sequences will start in Fall 1996. (Distance Learning Programs Leaflet, 1995)

b. Electrical Engineering Program

The distance learning program in Electrical and Computer Engineering is specifically tailored for graduate study in military communication systems, computer networking, power systems, radar and electronic warfare systems, and signals intelligence. Students having a Bachelor of Science in Electrical Engineering (B.S.E.E.) or equivalent can complete the program in their spare time in three years with a course load of only one course per quarter. Completion of a research experience and submission of a thesis is required. In many cases, their research can be completed at the sponsoring agency as part

of job-related activities. A typical master degree program in digital signal processing shown below.

First Year			
Quarter	1	EC3400	Digital Signal Processing
	2	MA3046	Linear Algebra
	3	EC3410	Discrete-Timer Random Processes
	4	EC3420	Statistical Digital Signal Processing
Second Year			
Quarter	1	EC3xxx	
	2	EC4420	Modern Spectrum Estimation
	3	EC4xxx	
	4	EC4450	Sonar Systems Engineering
Third Year			
Quarter	1	EC4xxx	
	2	EC4xxx	
	3	Thesis	
	4	Thesis	

(Distance Learning Programs Leaflet, 1995)

2. Distance Education Courses

NPS distance education courses are conducted at the same time on-site courses are held. Distance education students and on-campus students attend the same instructional period for the course. Distance education students are afforded the same opportunities as resident students. Tests are faxed to the distant site and proctors administer the test and federal express them back to the instructor for grading.

Department chairmen make all arrangements for offering a distance education course. The chairmen find the customers, coordinate the video teleconferencing connection with the distant site, arrange for student enrollment in the course, and find an instructor to teach the course.

3. Personnel

NPS Distance Education Program has a part-time technician and manager. The technician performs all required maintenance and evaluates new equipment and accessories for technical upgrades. The technician also performs the functions of coordinating initial connections with distant sites. If the distant site's standards are compatible, the connection is fairly straightforward and simple. The most frequent difficulty, according to Mr. Tracy Hammond, NPS's Distance Education Program manager, "is ensuring that the dial-up number required to interface to the remote site is readily available. Connection time ranges from a single phone call to as much as an entire week as it did when NPS attempted to hook up with NRaD in San Diego, CA. Due to incompatibility of standards and equipment, NPS was required to link to NRaD via Chief of Naval Education and Training (CNET) in Washington, D.C., and then CNET would connect to NRaD. In the case of say NAVAIR in Washington, D.C., it is just a matter of a phone call. NAVAIR has the same equipment installation as NPS and there are virtually no connectivity problems. However, NPS cannot connect to the Defense Language Institute due to incompatibility with their studio configuration."

NPS's manager assists in the process involved in setting-up a distance education course. The manager, Mr. Hammond, who works in the Registrar's Office, through his position oversees the student registration, course scheduling, instructor scheduling, and budgeting for all distance education courses. Mr. Hammond also schedules video teleconferences on the Root Hall video teleconferencing (VTC) system for all departments.

NPS distance education instructors are chosen from department faculty. They receive hands-on video teleconferencing equipment operation instruction from the Aero Space Engineering Department Chairman, Dr. Dan Collins. Dr. Collins was behind the start-up of NPS's first full-degree distance education program. He received some initial video teleconferencing training from Chico State University in California. There are no formal written instruction manuals for using the video teleconferencing equipment in Root Hall.

The NPS Distance Education Committee was established with NPS's start-up of distance education to oversee the distance education program. Dr. Maurice Weir, the Academic Associate for the Mathematics Department, is the Chairman of the Committee. The Distance Education Manager, academic department representatives, and an information resource services representative are members of the committee. The representatives range from support staff to academic chairmen. All representatives have some involvement in the distance education program at NPS.

B. NPS's VTC

1. The Delivery System

NPS Distance Education uses a synchronous delivery system. Synchronous instruction requires the simultaneous participation of all students and instructors. The resulting interaction is done in "real-time." This real-time, or live, interaction and the capability for immediate feedback are the advantages of synchronous instruction. Forms of synchronous delivery include interactive TV, audio graphics, and computer-conferencing.

Asynchronous instruction does not require the simultaneous participation of all students and instructors. Students do not need to be gathered together in the same location at the same time. Rather, students may choose their own instruction time-frame and gather the learning materials according to their own schedules. Asynchronous instruction is much more flexible than synchronous instruction, yet still allows and even may encourage community development. Forms of asynchronous delivery include electronic mail (e-mail), audio cassette courses, videotaped courses, correspondence courses, and world wide web (WWW) based courses (though WWW will probably offer synchronous formats in the near future.)

2. The Classroom

The distance education classrooms at NPS provide two-way, interactive audio and video communication between NPS and up to three other sites. These distant sites may be anywhere in the world with the appropriate telecommunications connections, and the requisite VTC hardware. Besides the connection to the distant sites, each NPS distance education classroom can accommodate up to 24 NPS students.

The distance education classrooms are located in Root Hall room 256 and 260. Additional video teleconferencing capabilities are located in Ingersoll Hall room 369 and the Mechanical Engineering Auditorium. The Registrar's Office schedules the use of the Root Hall classroom.

3. Site Equipment

Video teleconferencing is made possible by the use of a codec (a coder-decoder). This device encodes the audio and video signals into a form that makes it possible to send

the information over telephone lines. The codec also converts the incoming audio and video from digital to analog. The codec compresses the data to fit the transmission system being used. Compressed video processes video images; transmit changes from one frame to the next which reduces the bandwidth required to send over a telecommunications channel; which reduces cost.

In a video conference set-up the camera, monitor, microphones and speakers are wired directly to the codec. This limits the use of the codec to a particular individual or camera location. In the distant education classroom, any one of a number of combinations of different camera, monitors, microphone or speaker combinations can be connected to the codec under computer control. This permits the codec to be used from any number of different rooms, thereby enabling users to choose the most appropriate space for the distant education session. The NPS codec is a PictureTel 4000. It conforms to the H.261 standard and communicates with any other H.261 standard compatible codec. (Thomas, 1995)

Video monitors provide an image of the people at the distant site, and traditional visual aids such as transparencies and videotapes may be used. A document camera allows the instructor to compose or annotate instructional materials in real-time, in the same manner as using a felt pen with a traditional overhead transparency projector. A computer may be connected into the system for computer-based presentations. Presentations may be recorded on videotape.

The classrooms are equipped with fixed microphones, making conversations between the sites possible. Except for a slight delay, conversation can proceed as though

participants were in the same room, much like a telephone conference call. The microphones are also voice activated allowing each student to be heard when speaking and eliminating paper shuffle and other distracting noises.

The actual equipment supporting the Root Hall classrooms is the following:

- **Hardware**

  PictureTel System 4000, Model 200E
  PictureTel M8000 video bridge
  PictureTel "Socrates" control console
  PictureTel cameras
  Promptus OA200B Inverse Multiplexer

- **Presentation equipment**

  Canon RE650 Document Camera
  PictureTel Video Slate
  VHS Videocassette Recorder/Player
  VideoLogic "Mediator" computer scan converter
  Smart 2000 Conferencing System

- **Ancillary Equipment**

  Mitsubishi 35" video monitors
  Sony 32" video monitors
  Shure Automatic Microphone System
  Plain Paper FAX
  Conference Telephone
  Traditional desk-top telephone (Thomas, 1995)

4. Site Connections

Connections between the sites are established by dialing a phone number in the same manner as placing a normal telephone call. Special digital phone lines are utilized to transmit video and audio signals in each direction.

NPS site configuration is as follows:

- **Carrier**

  Outgoing video calls: FTS2000
  Incoming video calls: FTS2000 or commercial

- **Network**

  ISDN (Integrated Services Digital Network) conditioned data circuits
  Three lines per six channels total per room
  Each line: 2B+D, BRI (Basic Rate Interface)

- **Data Rate**

  56 kbps per channel
  336 kbps maximum per room

- **Compression Software**

  PictureTel SG3 Proprietary
  PictureTel Link 64E (H.320/H.261 compatible) (Thomas, 1995)

There are two ways for the distant site to call NPS: via FTS2000 or via a commercial telephone network. The area codes and prefixes are as follows:

Network:	**Area Code and Prefix**
FTS 2000	700-899-XXXX
Commercial Networks	408-656-XXXX

Video numbers for specific rooms:

Location:	**@336 kbps**	**@112 kbps**
Root Hall Rm. 256	6118/6119/6110	6118
Root Hall Rm. 260	6115/6116/6117	6115
PCS100 Desktop System	not capable of 336kbps	6112 (Thomas, 1995)

NPS can also use a bridge for multi-point video calls. Dialing into the bridge requires prior scheduling with the telephone carrier. Each site is assigned a particular number or numbers for each scheduled video call (depending upon the bandwidth requirements.)

5. Standards

The NPS system is compatible with International standards. It can operate with any system that employs the International Telecommunications Union (ITU) H.320 standard suite for video and data conferencing. The system's LAN Protocols are Audio Encoding: G.721, G.722, PT-724 proprietary algorithm and video encoding: H.261. The established standard allows the system to be connected to other compatible systems through FTS2000 or be bridged through the telephone company to connect with ACUNET, C-Net, and other compatible ISDN systems. The system is not configured at this time to transmit classified information. (Thomas, 1995)

According to Mr. Tracy Hammond, NPS's Distance Education Manager, "The most important compatibility issue is with the compression/decompression software. This software needs to be H.320 compatible. There are roughly three vendors NPS has worked with, Compression Labs, Tannenburg and PictureTel. NPS has equipment purchase through PictureTel. When you connect to another vendor such as Compression Labs, there is a reduction in the 'bells and whistles' that are vendor specific. The ideal is to connect to another PictureTel site."

6. Costs

Total cost for the Root Hall Distance Education Classrooms was $380,000.

Approximately $200,000. for the video teleconferencing system and the remainder was spent on necessary room renovations. In addition to the set-up cost the School continues to pay the support costs. (Thomas, 1995)

The support cost includes the cost of the part-time video teleconferencing equipment technician who maintains the equipment and performs required update support. The distance education course instructors receive extra pay for each course taught. The amount the instructors receive is approximately one and a half times what they would get for teaching an on campus class without the distant-end students. The telephone line usage cost is $50 per hour. The cost for the established bridge is an additional $22 per month. (Thomas, 1995)

APPENDIX B. CURRENT TECHNOLOGIES AND CONSIDERATIONS

A. CURRENT TECHNOLOGIES

1. Introduction

Today's advances in technology are paving a way for the future that is closer than many of us have predicted. Picture phones in everyone's home, on-line or virtual libraries, and one stop banking at automatic tellers with actual teller interaction, are examples of technological advances that are just around the corner. This appendix outlines some current technology advances and cost considerations that need to be reviewed before implementing a full-scale distant education program at NPS. These advances can assist decision-makers in providing the best possible far-reaching education program a graduate institution can provide. (The vendors, products, and technologies included are not all inclusive and where randomly selected to show a representative sample of what is current or on the horizon.)

2. Asynchronous Transfer Mode (ATM)

ATM, short for Asynchronous Transfer Mode, is an internationally accepted, high performance multiplexing and switching technology with minimal and predictable latency that promises to merge voice and data communications by integrating currently disparate communications services. It is the broadband-ISDN standard for emerging high speed information transfer systems.

a. Anatomy of ATM

In essence, ATM is a version of cell relay that works with very short, fixed-

length cells. This makes it possible to design switches with very low, fixed delays that are also bandwidth-efficient. An additional advantage of ATM is that it allows cell switching to be handled in hardware. Packet switching, in contrast, is best done by software. Thus, ATM designers can create very fast, cost-effective equipment. (J.T.J. 1993)

ATM cells contain 53 total bytes, five of which are header information and the remaining 48-bytes are payload. Such a short address space is possible because ATM is connection-oriented, meaning a circuit is established through the network before cells are transmitted. In contrast, most packet switching schemes require each frame to be addressed (J.T.J. 1993)

ATM associates each cell with the virtual connection between its point of origin and its destination, creating a virtual channel. The 65,536 virtual channels can be multiplexed onto a virtual path, or the channel can stand alone as its own path between points. Connections are virtual because they do not use bandwidth unless they are specifically in service, carrying traffic. (J.T.J. 1993)

b. ATM Traffic

ATM can handle different types of traffic because of its ATM Adaptation Layer (AAL). The AAL's goal is to find a way to tell switches they have to provide different types of service for different types of cells, i.e., those carrying voice could not tolerate much delay.

Originally, there were four types:

- Type one allows for a connection-oriented circuit and constant-bit-rate traffic, such as isochronous data like video or voice.

- Type two is also connection-oriented but is intended for variable-bit-rate traffic, such as packetized video.

- Types three and four are similar in that they establish a connection less circuit for variable-bit-rate traffic, such as LAN data; Type three is for traffic across multiple LANs, while Type four is for traffic across a single LAN. (J.T.J. 1993.)

c. Analysis

The advantages of ATM are its common switching and transmission architecture, support for interactive multimedia, high data rates, advertised "seamless" integration of WANs and LANs, and ability to connect to legacy systems. However, ATM technology is still in a state of flux, and is not as seamless as advertised. The technology is, however, promising to support distance education applications and will efficiently manage the bandwidth required for full video and audio transmission. (J.T.J. 1993)

d. Current Videoconferencing over ATM

ATM videoconferencing promises to be faster than ISDN, however, consistent service quality is essential for superior video transmissions and ATM is not yet ready to deliver reliable images. The class of service quality is implemented with the Q.2931 protocol and virtual circuits for dedicated signal transmission. The variable, available and constant bit rates can be specified in the ATM Adaptation layer (AAL) depending on what levels of cell loss and cell delay are acceptable. Specifications are still being developed and videoconferencing applications do not contain provisions for specifying AAL's. (J.T.J. 1993)

ATM, like, ISDN, will offer network designers the luxury of planning networks for any application. ATM can be considered a friend of the bandwidth hog - video teleconferencing. Yet still needed are reassurances that ATM set-up is capable of dealing with different types of video-compression algorithms. (Berlin, 1994)

Vendors are trying to take advantage of ATM in the world of video teleconferencing. One such instance is Newbridge Networks and InSoft:

> Newbridge Networks Inc will cooperate with InSoft Inc. to develop videoconferencing applications for Newbridge's Vivid ATM switches. Specifically, InSoft will combine the native ATM layer of Vivid's products with its Digital Video Everywhere software architecture. The aim is to improve videoconferencing quality and let network administrators manage bandwidth more effectively. The first product to come from the joint effort will be InSoft's Communique! ATM. InSoft's Open applications programming interface (API) will permit third-party developers to write applications that work with Vivid. Communique! ATM will ship in mid-1995 and will cost $1,700 per user. Pricing for a combined hardware and software package will start at $3,500. (Pappalardo, 1994)

3. Multicast Backbone (MBone)

MBone is a virtual network that has been in existence since 1992. Multicast provides one-to-many and many-to-many network delivery services for applications such as video teleconferencing and audio where several hosts need to communicate simultaneously. (Macedonia, 1994)

MBone tools provide audio and video across the Internet in a way that conserves bandwidth. Multicast lets a single information stream (such as video) touch multiple receiving machines, and also lets receiving machines ignore unwanted packets at the hardware level instead of wasting processor cycles deciding whether or not a given packet is of interest. Although tools are just beginning to be ported to Intel and Macintosh chip

sets, conferences and classes are currently being delivered using a variety of workstation architectures.

a. Multicasting

Multicasting has existed for several years on local area networks such as Ethernet and Fiber Distributed Data Interface (FDDI). However, with Internet Protocol (IP) multicast addressing at the network layer, group communication can be established over the Internet. Categorized officially as an IP Class D address, an IP multicast address is mapped to the underlying hardware multicast services of a LAN. (Macedonia, 1994)

The three things that will make multicasting feasible on a worldwide scale are:

- Installation of high bandwidth Internet backbone connections.
- Widespread availability of workstations and adequate processing power.
- Built-in audio capability. (Macedonia, 1994)

MBone is a virtual network, sharing the same physical media as the Internet. It uses a network of routers (mrouters) that support multicast. These mrouters are either upgraded commercial routers, or dedicated workstations running with modified kernels in parallel with standard routers. (Macedonia, 1994)

MBone is augmented by "tunneling," a scheme to forward multicast packets along MBone subnets through Internet IP routers that typically do not support IP multicast. This is done by encapsulating the multicast packets inside regular IP packets. Eventually, commercial routers will support multicast in the near future, eliminating the

inefficiencies and duplication of routers and tunnels. (Macedonia, 1994)

b. Bandwidth

Given a default video stream consuming about 128 Kbps of bandwidth, or nearly ten percent of a T-1 line for a site-to-site link, several simultaneous high-bandwidth sessions might easily saturate network links and routers. However, a multicast stream is bandwidth-efficient because one packet can touch all workstations on a network. Thus, the 128 Kbps video stream (typically one to four frames per second) uses the same bandwidth whether it is received by one workstation or 20. (Macedonia, 1994.)

Because a multicast stream can touch every workstation on a LAN and could pass from network to network, some controls are required so the Internet is not saturated by multicast streams. MBone controls multicast packet distribution across the Internet by either limiting the lifetime of multicast packets or using sophisticated pruning algorithms to restrict multicast transmission. Setting the time-to-live (ttl) field in a packet to a specified value would limit its transmission range (depending on how many routers it passes through). For example, a ttl value of 16 would likely limit a broadcast to a campus, as opposed to values such as 127 or 255, which would cause the packet to be broadcast worldwide. (Macedonia, 1994)

A MBone limitation is the required bandwidth. Bandwidth capacity lower than T-1 is generally unsuitable for video, thus in many countries and at some sites Internet bandwidth is inadequate. (Macedonia, 1994)

c. Protocols

In the hostile world of the Internet where variable packet delivery delays

and limited bandwidth play havoc with applications that require real-time guarantees, MBone makes transmitting video and audio over the Internet a reality.

What makes MBone possible are IP multicast and real-time stream delivery. The keys to this are multicast protocols such as the draft Real-Time Protocol (RTP) implemented on top of the User Datagram Protocol and Internet Protocol. RTP, being developed by the Audio-Video Transport Working Group of the Internet Engineering Task Force, provides timing and sequencing services, permitting an application to adapt and smooth out network-induced latencies and errors. Other real-time delivery systems are being evaluated and protocols are still being developed. To date, there is no standardized protocol. (Macedonia, 1994)

d. Applications

Besides basic networking technology, MBone researchers are developing new applications. Session availability is dynamically announced using a tool called sd (session directory), which displays active multicast groups. The sd tool also launches multicast applications and automatically selects unused addresses for any new groups. Video, audio, and a shared drawing whiteboard are the principal MBone applications provided by software packages called nv (net video), vat (visual audio tool) and wb (whiteboard), respectively. Others are under development. (Macedonia, 1994)

e. Analysis

The use of the MBone for distance education is not yet optimized, but many of its features need to be considered. Primarily, MBone's largest drawback is its video capacity. Capable of only one to four frames per second, MBone video is slow

compared to standard video rates of 30 frames per second. While acknowledging the phone-like and real-time quality of its audio component, the jerkiness of the video detracts from an optimal learning environment. (Gambrino, 1994)

On the other hand, MBone's ability to multicast educational courses on a worldwide scope and allow for audio and video archiving for digital video retrieval on demand demonstrates a unique robustness of MBone as an educational medium. With further technological advances, compression algorithms, and established procedures and protocols, MBone may one day be a viable platform over which to conduct distance education.

4. Desktop Capability

Desktop videoteleconferencing applications are expected to grow rapidly within the next few years. This area is the most promising for the development of distance education applications and industry is providing the catalyst for the development. Bandwidth available from LAN topologies (such as Isochronous Ethernet, Fast-Ethernet and Switched Ethernet) and LAN gateways (ATM) will encourage network video transmission. In most applications, users will share information on-line in one window of their screens, and display video images of themselves in another. Applications that allow document sharing and shared white boards have been added to some commercial systems, similar to those existing in the MBone environment. (Orh, 1994)

a. Standards

While the architecture of the set-top box is becoming fixed, videoteleconferencing systems are taking numerous forms as various companies fight for

the market share. As a result, there has been a huge variance among conferencing equipment standards. The hope is that more vendors adopt the evolving H.320 standard. (Orh, 1994)

Practically all digital video applications use some form of digital compressed technology MPEG compression. Digital TV applications use MPEG-2, while PC multimedia and H.320 videoteleconferencing standards rely on MPEG-1. While MPEG-2 strives to transmit 640x480 pixel frames at 30 frames per second (fps), H.320 specifies 320x240 pixel frames transmitted at 15 fps. (Orh, 1994)

H.320, a superset of the H.261 video image compression standard, was constructed around ISDN bandwidths. Two 64-Kbps ISDN "B" channels provide an aggregate bandwidth of 128 Kbps which is acceptable for transmitting MPEG-1 compressed images at 15 fps. Currently, however, there is not enough bandwidth to provide larger screens or faster frame-rates suggested by MPEG-2, unless other compression algorithms are developed. Thus, an ISDN-transmitted picture will still have a certain amount of jerkiness depending on the amount of motion in the video. (Orh, 1994)

b. Analysis

Desktop videoteleconferencing is the hope of many people and, if realized, will enable users to sit at their individual desks to receive distance education. However, the commercial systems being developed are mostly proprietary, requiring users at both ends to have common architectures. Efforts are being made to conform to evolving standards, but still reflect a computer-centric mentality.

Desktop videoteleconferencing requires dedicated set-ups, either a dedicated communications line, such as a T-1 line, or an established LAN. As industry drives development, systems will be more robust, allowing users to tune into live lectures or retrieve archived audio and video on demand. Also, multicast capabilities, a true network-centric mentality, will evolve as the benefits are realized and more users request it. (Orh, 1994)

5. Integrated Desktops

Network MCI Business, an online news, electronic mail, messaging, and conferencing service is a nationwide business desktop service. It is Windows based and costs $100 for the software and $65 per month for the service (unless a MCI's Preferred Customer phone subscriber then just $50) (Piven, 1994). The service is an integrated package that combines a newswire service: a virtual marketplace for advertising goods and services; a point-to-point conference module; fax functions; Internet access; and optional videoconferencing equipment. MCI leases the videoconferencing equipment for $110 per month under a three-year contract (Piven, 1994). "MCI is the first company to provide an on-line information service that is fully customizable." claims Frank Walter of MCI Business Markets. (Piven, 1994)

Although this service may not be cost-effective with the present full scale videoconference price, it could be used on a trial basis or for intermittent periods of use. It is also a service to be aware of and keep an eye on for future growth and possible cost decrease.

6. Internet Phones

VocalTec has developed audio quality comparable to speaker phone that let's users speak while using the world wide web or collaborate on documents. The application is limited to point-to-point calling and is being tested for multi-point and whiteboard applications. Since voice transmission is not a bandwidth hog, this application at 14.4 kbps has only half a second round-trip transmission delay for domestic calls (Tadjer, 1995). This product allows personal computer users anywhere in the world talk to each other for the price of dialing into their local access providers. Voice communication while interacting with the Internet could be an applicable learning environment for NPS to explore.

7. Digital Simultaneous Voice and Data (DSVD)

Digital Simultaneous Voice and Data (DSVD) technology development is currently underway which would allow for easy and affordable personal conferencing carried across standard telephone lines. Data conferencing or videoconferencing would be the choice to be made. Data conferencing would enhance distance education at a low cost when DSVD becomes successful. DSVD is being explored by a number of hardware and communication developers. One developer is AT&T Paradyne Corp with its Voicespan technology. This technology provides simultaneous voice and data capabilities via standard phone lines. Also, U.S. Robotics has its Sportster DSDV solution modem. The Sportster is bundled with Intel's Proshare Premier Edition software and costs $399. The trouble with this technology is that it lacks standards approved by the ITU and the process is expected to take another 12 months to officiate the specifications. (Dunlap, 1995)

8. Audio and Video over FDDI LAN's

a. FDDI

The use of high speed fiber optic local area networks is beginning to appear in user applications. The Fiber Distributed Data Interface (FDDI) is a set of standard created by the American National Standards Institute X3T9.5 Task Group. The FDDI standard is a token-passing ring LAN that operates at 100 million bits per second over an optical fiber medium. FDDI LANs control access by means of an electronic token that passed from one station to another. The FDDI token is a special media-access control (MAC) frame that allows only one station to transmit at a time. FDDI uses a "timed-token rotation" that limits the amount of time the station can hold the token before passing it to the next station. FDDI uses two counter-rotating rings called the primary ring and the secondary ring. Data traffic usually travels on the primary ring, although input data can travel on one ring and output data on the other. The secondary ring also can serve as a backup transmission path. (Fitzgerald, 1994)

b. Current VTC over FDDI

Alfa Vision Motion is a JPEG (Joint Photographic Experts Group), windows-based videoconferencing package. The package includes both hardware and software components:

- Motion-JPEG Codec adapter
- Alfa's FDDI adapter card (ISA/EIA), fiber-unshielded-twisted-pair, for high-bandwidth availability
- Alfa Vision Windows-based videoconferencing software. (Kelly, 1994)

Alfa Vision Windows-based videoconferencing software package allows for three concurrent one fourth screen video windows for local and remote views and supports 30-frames-per-second video. Resolution can be set at 240x240 or 320x240 with 256 colors. Continuous stereo and high-fidelity audio are synchronized with the video transmission. The package is priced between $1,795 and $2,095. (Kelly, 1994)

B. TECHNOLOGICAL CONSIDERATION

1. Negroponte Switch

By about the year 2000 what is now broadcasted over satellites will be sent over cables and what is now sent over cables will be broadcast over satellites. The telephone companies have been replacing the current cables that are either twisted pair or coaxial cable, at a rate of five percent per year over the past 15 years. It is estimated that about year 2000 most cables will be fiber optic. This will increase the speed at which data can be sent from point A to point B a hundred fold. The 'Negroponte Switch' is the theory that information now transmitted over airwaves will be sent over fiber optic cables and the information sent over cables now will be sent over the airwaves. This trend is illustrated by cellular telephones and cable television. The implications of this widely available technology are that airwaves will only be used for mobility. The Negroponte Switch theory states that data will be sent via the fastest means possible; for example, over land lines to a drop off point where it can be sent over the airwaves to a remote site where there is no fiber optic cable available. In terms of video teleconferencing this will enable individuals to broadcast to any user any place in the world. (Negroponte, 1994)

2. Moore's Law

Moore's Law states that the transistor will grow smaller at an exponential rate. This law states that the number of transistors on a chip will double every 18 months. The law also states that prices will be halved in this same period. The implications of Moore's Law are that the silicon chip will run out of room in the year 2003. The implication for video teleconferencing is that technology will get better and better and cheaper and cheaper however, the question will be what the top-end requirement speed will be. Plotting Moore's Law against an industrial growth curve indicates, at some point, this exponential growth will no longer be relevant. However, multiple chips, for example parallel processing, can be employed to go beyond this limitation. (Lewis, 1995)

3. Compression Ratio Increasing

Current technology is available to have VHS like quality distant education but the price for this technology is at a premium. "Although it is possible to record raw video on hard disks, the controllers and buses used in desktop computers don't support high enough data rates to do so economically. The solution is to compress the video data, preferably using dedicated chips that permit on-the-fly compression and decompression." (Seybold, 1995.) Fiber optic technology is projected to be so widely available in the year 2005 that compression and decompression will not be an issue because of the large bandwidth that will be available over fiber optic lines. (Seybold, 1995)

4. Propagation Delay

Propagation delay will be less and less of an issue in the year 2005 because of the availability of fiber optics and Low-Earth-Orbit-Satellite (LEOS). Fiber optics will

increase propagation speed because of the larger bandwidth and the data being sent in digital format at the speed of light. The current satellite delay is a serious issue especially when sending voice. The round trip delay of satellite propagation is 250 milliseconds which is significant enough to cause complications when video is transferred. Voice can only be transferred in a half duplex manner which will cause awkwardness in the interaction between the professor and the students. LEOS may be an answer to the current propagation delay in satellite communications. The LEOS will also take less power and will be more cost-effective. The current satellites used are in a 22,000 mile geosynchronous orbit around the earth. The LEOS satellites will be located 800 miles from the earth. This will enable the LEOS satellites to cut propagation time by one thirtieth of what the current geostationary satellites demand. (Tadjer, 1995)

5. Government Regulation

The relationship between new technology versus cost can be illustrated by two exponential curves. The first curve relates to Henry Ford and the Model 'T'. In a 15 year period the prices dropped exponentially which made it possible for new technology to be widely economically available to the majority of the working population. The second curve is the growth of the telephone industry which was a government regulated market. The telephone was invented in 1878 and the first American President to have a telephone on his desk was Herbert Hoover 51 years later in 1929. The telephone industry took almost 100 years to reach saturation that is widely believed to be because of government regulation. (Lewis, 1995)

The current issue in Congress is the amount of regulation that this technological

information growth industry will be subject too. We project that this technology will continue to be allowed to grow exponentially in a free market environment. Therefore allowing the technology to grow exponentially, the price will be low enough that the majority of the population can take advantage of video teleconferencing.

C. CONCLUSION

As personal-conferencing becomes more widespread the future concern will be cost. It is predicted that videoconferencing price barriers should fall in 1996. (Moorhead, 1995) Today desktop videoconferencing is generally priced between $2,000 and $5,000 and document or application-sharing software costs $100 to $200. (Moorhead, 1995) Therefore in some instances where actual face-to-face application is not required just exchanging graphical information should be considered.

In the business world document-conferencing is more popular, because of the ease of implementation, use, management and low cost. Personal-conferencing is gaining momentum and Information Specialist managers are having to considering whether document or videoconferencing best suits the companies needs. The bottom-line is that the personal computer is becoming a personal-communications device and managers need to recognize this and move forward into the future.

The question is not whether a company or institution will begin using video conferencing but when. Videoconferencing can bring unexpected uses to the user. Today's user cannot afford to miss these opportunities. The Institute of Agriculture implemented VTC to cut travel cost and found benefits more from diagnosing plant diseases and parasites. The uses of VTC once implemented just mushroom. (Moorhead,

1995.)

Presently with VTC, LAN Infrastructure, and standards are a hold up. These areas are improving daily yet early videoconferencing adopters shouldn't expect hardware and software investment to last more than 18 months. Compatibility can usually be worked around and there are many standards being put in place to improve videoconferencing of tomorrow. The realm of videoconferencing is out there but it still has its fair share of bugs to be worked out. (Moorhead, 1995)

One final consideration when looking at cost and advancing technologies over time, for distance education is the following quote from Scott Darling marketing director for Intel Architecture Lab, "In two to three years you'll be buying (VTC) applications as $250 add-ons that run using the host processor. I would easily wager in that time-frame it will not be possible to buy a PC off the shelf without this technology built in." (Schroeder, 1995)

APPENDIX C. NPS STRUCTURE AND ACADEMIC DEPARTMENTS

A. NPS STRUCTURE

In the Naval Postgraduate School (NPS) catalog the School is defined as follows:

> The Naval Postgraduate School (NPS) is an academic institution whose emphasis is on study and research programs relevant to the Navy's interest, as well as to the interest of other arms of the Department of Defense. The programs are designed to accommodate the unique requirements of the military.

NPS has a unique dichotomy structure. A military based chain of command structure for its support and administration and an academic institution structure for its faculty and academic teachings. The Superintendent oversees both structures. She has command and responsibility for accomplishment of the School's mission. In addition, the Superintendent is the academic coordinator for all graduate education programs in the Navy.

NPS's academic structure is built on the traditional academic discipline. Administrative positions of this structure support faculty, research, graduate studies, instruction and information services as they pertain to the academics of the institution. The internal structure of this group is slow to change. NPS's academic structure is based on a proven method of instruction.

The administration structure changes often to meet the needs of those it supports. As the Department of Navy (DON) requires new disciplines the administration requires academic groups be put in place to support the needs of DON. The curricular offices are

the heart of this structure and interact with the academic educational operations of the School. Based on a military structure the curricular offices (1) support the officer students attending the School, (2) direct curriculum development and management to ensure attainment of professional and academic objectives, and (3) liaison with the curriculum sponsor representatives. The tradition of this military-based structure is to adapt to its changing environment to survive. Thus, the administrative structure is continually changing to meet the needs of its sponsors and the DON.

B. NPS ACADEMIC DEPARTMENTS

NPS has eleven academic departments and four interdisciplinary academic groups. Table 1 lists all departments and groups.

ACADEMIC DEPARTMENTS	ACADEMIC GROUPS
Aeronautics and Astronautics	Command, Control and Communications
Computer Science	Electronic Warfare
Electrical and Computer Engineering	Space Systems
Mathematics	Undersea Warfare
Mechanical Engineering	
Meteorology	
National Security Affairs	
Oceanography	
Operations Research	
Physics	
Systems Management	

Table 1. Academic Departments and Groups

Each of these departments and groups is supervised by a chairman who reports to the Dean of Faculty. The Dean of Faculty reports to the Provost. The Provost/Academic Dean is the chief educational officer and is responsible to the Superintendent for all academic matters.

Each curriculum program meets specific needs of the Navy. Each curriculum has a DOD sponsor who sets the educational skill requirements to meet the needs of the Navy. Sponsors define the educational skill requirements and curriculum departments ensure the requirements are met.

APPENDIX D. NPS MISSION AND VISION STATEMENTS

A. NPS MISSION

The mission of the Naval Postgraduate School is to enhance the security of the United States of America through graduate and professional education programs focusing on the unique needs of the military officer. These programs are sustained by research and advanced studies directed toward the needs of the Navy and DOD. Our goals are to increase the combat effectiveness of the armed forces of the U. S. and its allies, and to contribute to fundamental scientific, engineering, policy, and operational advances that support the Navy, DOD, and other national security establishments. (NPS Mission, Vision, and Guiding Principles, 1995)

B. NPS VISION 2000

- We will be the world leader in defense-related graduate education and research, particularly as they relate to the maritime component of defense problems and the integration of this component into joint operations.

- NPS education will be recognized as a key ingredient in the career development of military officers, as a vital enhancement of their war fighting capabilities, as a critical step in preparing for joint and combined assignments, and as a key element leading to high-level leadership positions.

- We will provide the future leaders of the armed services with the technical, analytical, and managerial skills needed to create and sustain efficient, cost effective, and fully combat ready military forces.

- We will give our students the highest quality, most efficient graduate education, focused on enhancing the officer-students' capabilities to meet the Navy's needs, as well as those of the rest of DOD.

- We will be a leader in educating international officers and in promoting international understanding and cooperation. In addition, we will continue to provide quality graduate education to those federal employees who are interested in defense-related programs.

- Our research programs will be recognized by the Navy and the DOD, nationally and internationally, for making creative, critical, responsive, and cost-effective contributions. We will remain on the leading edge of advances in defense related science, technology, management, and policy.

- Our faculty will play leading roles in major national and international research and development activities, will be recruited to key DOD positions, and will be recognized for providing expert advice on defense matters.

- Student thesis and faculty publications will be recognized and valued throughout the Navy and the rest of DOD for their quality, relevance, and their contributions to the solution of important national problems.

- We will participate energetically in Monterey Bay Consortium of Educational and Research Institutions to leverage our assets and to provide a higher quality educational and research environment for our students, faculty, and staff. (NPS Mission, Vision, and Guiding Principles, 1995)

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