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## THESIS

ANALYSIS OF THE KOREAN NAVY  
SELECTION PROCESS FOR THE  
NAVAL POST GRADUATE SCHOOL

by  
Joo, Hyung Kyu

June 1988

Thesis Advisor:

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Postgraduate School

by

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Lieutenant , Korean Navy  
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Submitted in partial fulfillment of the  
requirements for the degree of

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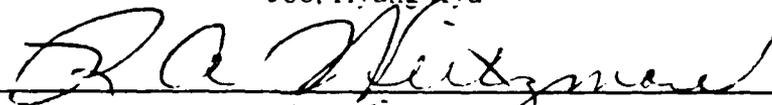
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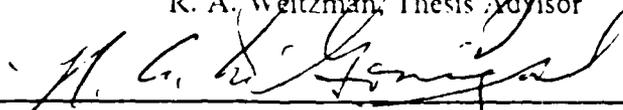


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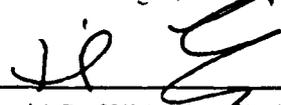
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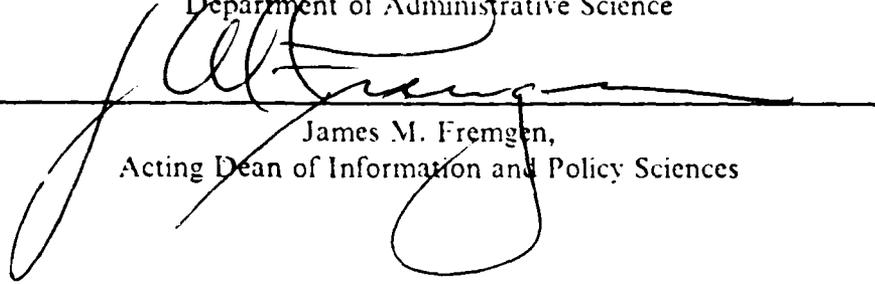
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## ABSTRACT

The purpose of this thesis is to identify and analyze problems in the selection process of Korean Navy students to attend NPS, as well as to suggest a selection model that allows for channeling of high-potential Korean Navy officers into NPS in a way which is least expensive to the Navy and most appropriate for officer professional development.

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## I. INTRODUCTION

### A. INTRODUCTION

The rate of expansion of the Korean Navy in the past few years, along with the purchase of modern material and highly advanced weapon systems, has caused this organization to require competent human resources capable of coping with a high work load and increasing technological sophistication. One implication has been the need for officers capable of efficiently managing these valuable people and material resources. As a result, the military has begun to educate some of its officers in the field of occupational codes.

In the past decades, a number of Korean Navy officers have been sent to NPS (Naval Postgraduate School) for postgraduate programs working towards a masters degree. Especially, in the last ten years, the number of Korean Navy students at NPS has been greatly increased compared with the earlier years.

The Korean Navy sends more than 50% of its overseas postgraduate students to NPS. Therefore, the Korean Navy selection process for NPS is very important to the future of the Korean Navy.

Presently, the selection process has some problems in determining who attend and which curriculum they will study. The majority of students are all in limited curricula and occupational codes. This often excludes some occupational codes. Other vital curricula are under-represented. This policy limits the exposure of a wide variety of officers to various important curricula that could play a key role in the effectiveness of the Korean Navy.

The selection is very important to organizational effectiveness. The Navy personnel department wants to make careful, informed choices. These decisions should be based on relevant information that is not too costly or time-consuming to collect. Selecting the wrong students causes valuable training time and money to be spent on the wrong students, makes supervisors waste time on subordinates who cannot or will not perform well no matter how skillfully managed, and demotivates co-workers who do not get their needs met. In this phase, a good system for selecting Korean Navy students to attend NPS must be designed to facilitate the successful completion of NPS education and increase potential benefits for the military organization through the selection of highly qualified officers as the candidates.

The purpose of this thesis is to identify and to analyze problems in the selection process of Korean Navy students who attend NPS, as well as to suggest a selection model that allows for channeling high-potential Korean Navy officers into NPS in a way which is least expensive to the Navy and most appropriate for officers' professional development.

## **B. OUTLINE**

Chapter II provides an overview of the selection process literature. Chapter III reviews the current Korean Navy selection process and problems. Chapter IV analyzes the current selection process. Chapter V introduces an effective model for the NPS selection process. Chapter VI summarizes the conclusions of this study.

## II. LITERATURE

Personnel selection is the process of determining whether candidates who have been recruited have the necessary qualifications for the specific job openings and of choosing those persons who best fit the job requirement or specifications. [Ref. 1: P. 135]

The personnel selection process largely determines the future of an organization for it provides not only the people to perform current jobs, but also a "pool" of available personnel from which promotions develop the institution's future leadership position. [Ref. 2: P. 192]

The selection process involves mutual decision making. The organization decides whether or not to make a job offer and how attractive the offer should be. The job candidate decides whether the organization and the job offer will fit his or her needs and goals. [Ref. 3: p. 535]

Figure 1 shows how the selection procedure is related to the other phases of selection.

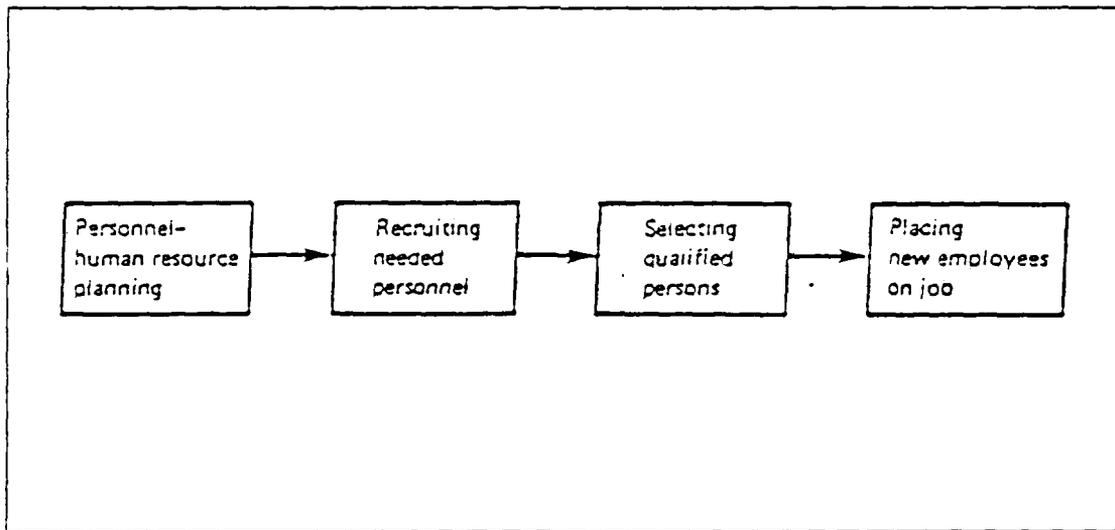


Figure 1. How the Selection Procedure Fits into the other Procedures

### A. SELECTION MODEL

The process of making an informed hiring decision depends largely on two basic principles of selection. The first principle is that past behavior is the best predictor of

future behavior. Knowing what an individual has done in the past is the best indication of what the individual is likely to do in the future. This principle is not deterministic; an employee who has been outstanding in previous jobs may only be mediocre in a new position.

The second basic principle of employee selection is that the organization should collect as much reliable and valid data as is economically feasible and then use it to select the best applicants. Reliable data refers to information that is repeatable and consistent. Valid data refers to information that indicates how well employees will perform their jobs. [Ref. 4: P. 201]

The performance of the selection function is based upon the assumption that it is possible to find potential employees with the proper combination of personal characteristics required for the successful performance of given jobs. The second assumption is that sufficient valid information can be obtained about the applicants in order to make a valid employment decision. Although these assumptions are not entirely accurate, at least they are valid approximations that will have to suffice until a more "scientific" approach is found. For now, selection involves matching the candidate's personal qualifications with the specified requirements of the job. [Ref. 2: p. 194]

The personnel selection model is presented in figure 2. The classic selection model is based on individual differences. It tries to select those people who have the greatest number of attributes deemed important for job success. [Ref. 5: p. 208]

### **1. Job Analysis**

Job analysis can be defined as the process of gathering pertinent information and determining the component elements of a job by observation and study. Job analysis records details concerning training, skills, required efforts, qualifications, abilities, experiences, responsibilities, and so forth, which are needed for the job. In essence, it evaluates the qualitative demands of a job and is the procedure used when a job is studied for any of the following purposes: recruitment and placement of employees; classification and evaluation of present employees; establishment of performance standards; and job evaluation. [Ref. 2: p. 151]

For both recruitment and selection, job analysis is a tool which provides important basic information about the job requirements based on a careful study and description of the actual duties of the position.

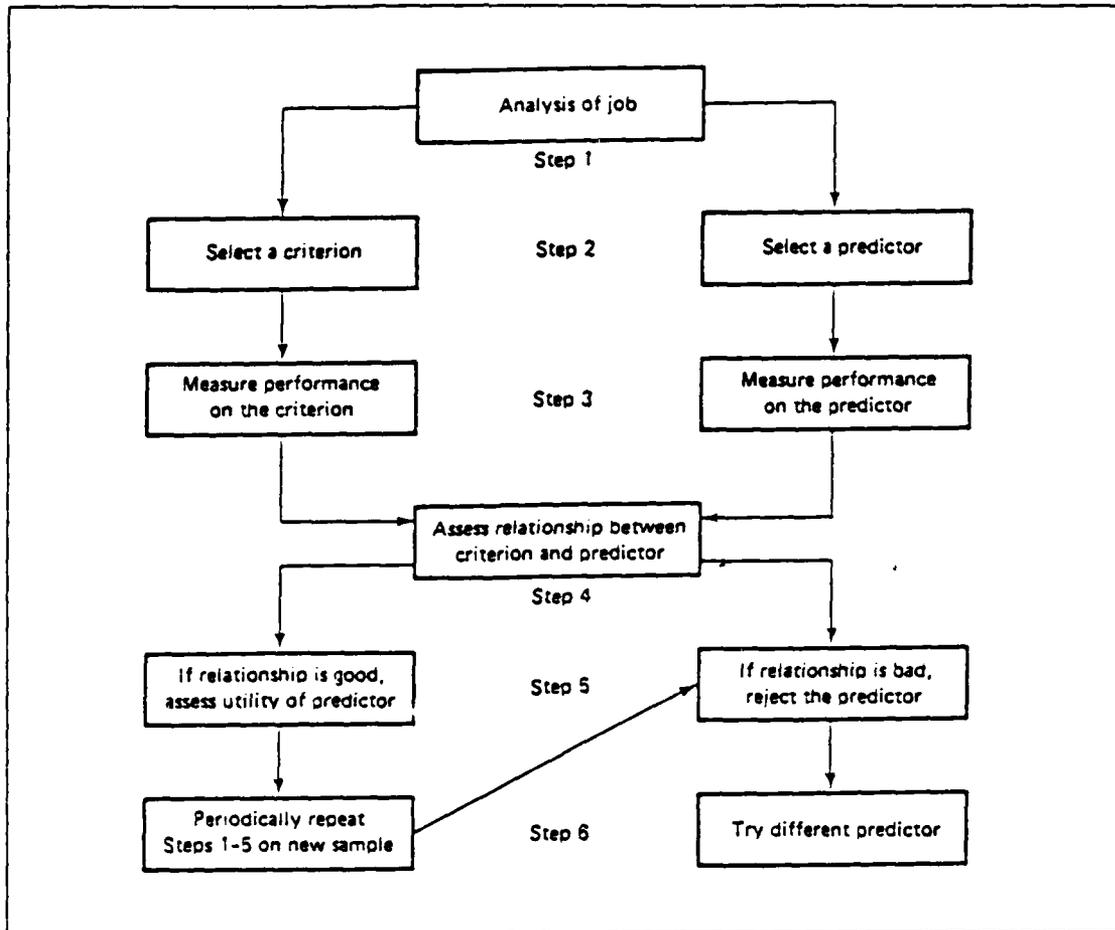


Figure 2. The Classic Selection Model

By inference, at least, job analysis can also provide information about the characteristics of people who might perform the job most successfully. Two major products of job analysis, then, are job descriptions and statements of worker qualifications. [Ref. 6: p. 4-23]

## 2. Selection of Criterion and Predictors

### a. Criteria

Criteria are best defined as evaluative standards; they are used as reference points in making judgements. Criteria are most important for defining the "goodness" of employees, programs and units of the organization as well as the organization itself.

What should criteria be like? This listing by Blum and Naylor (1968) is most representative:

1. Reliable
2. Realistic
3. Representative
4. Related to other criteria
5. Acceptable to the job analyst
6. Acceptable to management
7. Consistent from one situation to another
8. Predictable
9. Inexpensive
10. Understandable
11. Measurable
12. Relevant
13. Uncontaminated and bias free
14. Sensitive

This list might be reduced to three general factors: Criteria must be appropriate, stable, and practical. They should be relevant and representative of the job. They must endure over time or across situations. Finally, they should not be too expensive or difficult to measure.

Other authors (e.g., Weitz, 1961) think that other issues are important; for example, the time at which criterion measures are taken (after one month, six months on the job, etc.); the type of criterion measure taken (performance, errors, accidents, etc); and the level of performance chosen to represent success or failure on the job (e.g., college students must perform at a C level before they can graduate). Weitz says the choice of criteria is usually determined by either history or precedent; but unfortunately, sometimes criteria are chosen because they are merely expedient or available. [Ref. 5: p. 99]

#### *b. Predictors*

A predictor is any variable used to forecast a criterion. Personnel selection methods conceivably could be evaluated by many standards.

The first is validity, which refers to the predictor's capacity to accurately forecast criterion performance. Many authorities would argue that validity is the predominant evaluative standard in judging selection methods; however, the relevance of the other three standards is also substantial.

The second standard is fairness, which refers to the predictor's ability to render unbiased predictions of job success across applicants in various subgroups of sex, race, age and so on.

Applicability is the third standard and refers to whether the selection method can be applied across the full range of job and applicant types. Some predictors have a wide applicability in that they appear well suited for a diverse range of people and jobs. Other methods have peculiar limitations that reduce their applicability.

The final standard refers to the cost of implementing the method. The various personnel selection methods differ markedly in their cost, which has a direct bearing on their overall value. [Ref. 5: p. 162]

### *c. Determining Selection Criteria*

To be most successful in selecting the right person for the right job, the personnel manager needs to determine through research which personal variables are the best predictors of performance for specific jobs, establish these as the characteristics to be sought in prospective employees, and then design a selection procedure which will enable one to ascertain to what extent a given applicant possesses them. It is possible to design a rating scale which can be used to evaluate applicants successfully if the exact requirements of the job are known, if the degree of importance of each requirement to the total position is known, and the accuracy of the predictive variables are validated.

Figure 3 shows some of the personal characteristics most frequently sought in prospective employees, along with the step(s) in the selection procedure where information about the trait is sought. [Ref. 1 : p. 271]

Some words of caution are in order relative to seeking out these items of information. First, the details of some of this information may be in violation of public policy, especially if used in conjunction with other data or criteria in such a way as to suggest prima facie evidence of intent to discriminate against any of the protected groups.

<b>Personal characteristics needed to perform job adequately</b>	<b>Sources of information upon which to evaluate if characteristic is present</b>
Personal background	Application blank Preliminary interview School records References Diagnostic interview
Aptitudes and interests	Application blank School records Psychological tests References Interviews Work records
Attitudes and needs	Interviews Psychological tests References
Analytical abilities	School records Psychological tests Diagnostic interview Work references
Skills and technical abilities	School records Training records Interviews Work references Performance tests
Health, energy, and stamina	Medical examination Diagnostic interview Work reference
Value system	References Diagnostic interview

**Figure 3. Personal Characteristics sought in Prospective Employees and Source of Information about Them**

Second, as no individual will possess all qualities considered to be desirable as they will not appear in the proper quantity and quality sought, an acceptable combination of maximum and minimum cutoff points should be predetermined. Finally, a criterion

which is generally accepted at one point in time may prove to be arbitrary or indefensible at another time or place. [Ref. 2 : p. 201]

### **3. Measuring Performance**

Criterion or job performance data can be collected in either a concurrent or predictive validity design. The difference between these two research designs has been the topic of much discussion in personnel selection research. The major distinction between concurrent and predictive criterion-related validity is the time interval between collection of the predictor and establishing criterion data. [Ref. 5: p. 210]

#### *a. Concurrent Validity*

This is sometimes referred to as the present-employee method. In effect, it is the extent to which the results obtained with a selection technique (such as a test) are statistically related to the performance of employees currently on the job. This approach permits the immediate determination of the usefulness of that selection instrument. [Ref. 5: p. 220]

This design has been criticized on several points: (1) Test scores are obtained from individuals already employed in the job, therefore, the results may not apply to the applicants objectively. (2) It is possible that current employees change by developing particular skills necessary for success on the job. (3) Job incumbents may also respond differently while taking the tests than job applicants. [Ref. 7: p. 33]

#### *b. Predictive Validity*

This validity, sometimes referred to as the follow-up method, is arrived at by using the selection technique on all applicants who apply for the job. As the instrument itself is being tested, acceptances or rejections should not be made on the basis of the results ("scores"), but hiring decisions should be made on the basis of other selection techniques. After the new employees have been on the job sufficiently long enough to obtain a true measure of their performance, a statistical correlation is prepared between their earlier "scores" on the instrument and the criterion used to obtain a true measure of successful performance. [Ref. 5: p. 220]

#### 4. Assessing the Predictor's Validity

This is to determine if differences in predictor scores correspond with differences in criterion scores; that is, does the predictor have validity? This procedure is done with statistical analysis, in most cases by computing a correlation coefficient. If the predictor has validity, there will be some appreciable relationship between predictor scores and criterion scores. If the predictor is lacking in validity, there will be no correspondence between the sets of scores. [Ref. 5: p. 209]

#### 5. Determining the Predictor's Utility.

The utility of a predictor is the degree to which its use improves the quality of the people being selected beyond what it would have been had that predictor not been used (Blum & Naylor, 1968). [Ref. 5: p. 195]

##### a. *Criterion Reliability*

The measures of job performance against which a predictor is validated must be stable. Stability in the criterion is imperative. It means little to talk about "average" job performance when performance fluctuates widely.

##### b. *Criterion Relevance*

Criterion relevance is the degree to which the actual and conceptual criteria coincide. The greater the match between them, the greater the criterion relevance. [Ref. 5: p. 81]

It is important that the actual criterion selected to represent the conceptual criterion of job performance be an appropriate measure. The utility of a predictor is gauged by the improvement in the quality of the people being hired, so the criterion must be an accurate indicator of quality. [Ref. 8: p. 196]

##### c. *Predictor Reliability*

The greater the validity of the predictor, the greater its utility as measured by the increase in average criterion performance for the accepted group over that for the total group.

*d. Selection Ratio*

The selection ratio is defined as the number of job openings( $n$ ) divided by the number of job applicants( $N$ ), or

$$SR = \frac{n}{N}$$

When the SR is equal to 1 (there are as many openings as there are applicants) or greater (there are more openings than applicants), the use of any selection device has little meaning. [Ref. 5: p. 198]

The relationship between SR and predictor utility should be clear: The smaller the SR, the greater the predictor's utility or value. This should also make sense intuitively. The fussier we are in admitting people (i.e., the smaller the selection ratio), the more likely it is that the people admitted (or hired) will be of the quality we desire. [Ref. 5: p. 199]

*e. Base Rate*

The base rate of success refers to the percentage of employees that can be considered successful without the use of the new predictor. The relationship between the base rate and predictor utility is somewhat deceptive, since it depends on the way gains in average criterion performance are viewed. The possibility for the largest potential gain in criterion performance (in a relative sense) occurs for low base rates. However, in absolute terms, the largest gains in average criterion performance will occur with a base rate of .50; that is, a new predictor will produce the greatest increase in the number of people who will attain satisfactory performance if the base rate is .50. [Ref. 5: p. 201]

*f. Cost*

All other things being equal, the predictor that costs the least to administer has the greatest utility. In many cases, however, all other things are usually not equal. For example, sometimes the most valid predictor also costs the most money to administer or score. The increases in validity usually compensate for any increases in cost - unless, of course, the predictor is prohibitively expensive. Predictor validity has the greatest impact on utility, so in almost all cases, a more valid predictor is worth it. [Ref. 5: p. 201]

The greatest utility will occur when the predictor is highly valid, the selection ratio is low, the base rate is .50 and the cost of the predictor is low.

## **6. Reanalysis**

Over time, jobs can be changed, applicant pools can be altered, predictors can lose validity and invalid predictors can be periodically reevaluated to see if changing employment conditions have altered the predictor-criterion relationship. This should be done at least every five years. [Ref. 5: p. 210]

## **B. GATHERING INFORMATION ABOUT POTENTIAL EMPLOYEES**

### **1. Application Form**

The application form serves three purposes. First, it formally indicates that the applicant desires a position. Second, it provides the interviewer with the basic information he or she needs to conduct an interview. Third, it becomes a part of the organization's personnel information if the applicant is hired. [Ref. 3: p. 535]

### **2. Preliminary Interview**

The initial screening interview is used to make a quick evaluation of the applicant's suitability for the particular job. In effect, the initial interview determines for both the applicant and interviewer whether or not the selection process should proceed. The preliminary interview is designed to eliminate individuals who are obviously disqualified because of poor appearance, physical disability, unavailability for employment, lack of serious interest in the job or the opportunity it provides and so forth. [Ref. 3: p. 535 536]

### **3. Testing**

It has been noted that one of the essential aspects of selection involves the assessment of differences in abilities, aptitudes and personality characteristics that exist among job applicants. [Ref. 1: p. 145]

Through testing, the organization attempts to judge the candidate's capacity to learn on the job or whether the candidate has the skills needed. [Ref. 3: p. 536]

### **4. Background Investigation**

In a background investigation, the truthfulness of a candidate's resume or application form will be checked, and further information will be sought from one or more of the candidate's references or previous employers. Such an investigation is useful, since

studies have shown that as many as half of the applications submitted contain false or erroneous material. [Ref. 3: p. 537]

### **5. In-depth Selection Interview**

The in-depth selection interview is designed to fill in gaps on the candidate's application or resume; find out more about the applicant as an individual; and, in general, obtain information of interest to the interviewer so that the suitability of the candidate for the job and the organization can be determined. Unlike the screening interview, which is usually conducted by a member of the personnel department, the in-depth interview is usually conducted by the manager to whom the candidate would report if hired. [Ref. 3: p. 537]

### **6. Physical Examination**

The physical examination is designed to ensure that the candidate can perform effectively in the position for which he or she is applying, to protect other employees against contagious disease, to establish a health record for the applicant and to protect the organization against unjust worker's compensation claims. [Ref. 3: p. 537]

## **C. SELECTION DECISION**

### **1. Selection Strategies**

#### *a. Multiple Regression*

The multiple regression selection strategy is based on the statistical procedure of multiple regression analysis. This method involves the use of two or more predictors weighted and added together to enhance the prediction of criterion. Using a two-predictor model and assuming  $a = 0$ , the multiple regression equation would be

$$Y = b_1X_1 + b_2X_2$$

This approach assumes that (1) there is a linear relationship between the predictors and the criterion (i.e., higher scores on the predictor will lead to higher scores on the criterion) and (2) having a lot of the attributes measured by one predictor compensates for having only a little of the attributes measured by the second predictor. While the former

assumption (linearity) is usually met, the latter assumption (compensating predictors) is a more serious limitation. [Ref. 5: p. 212]

***b. Multiple Cutoff***

The multiple cutoff selection strategy is an alternative to the multiple regression strategy. The multiple cutoff method is limited by neither a linear relationship between predictors and criterion nor the problem of compensating predictors. This straightforward and uncomplicated method assumes that a minimal amount of ability on all predictors is needed for job success. Minimal passing score cutoffs are set for each predictor. If an applicant is below the cutoff on any predictor, he or she is rejected. All applicants who have scores at or above the cutoff are hired. Having a high score on one predictor cannot compensate for having a low score on another. [Ref. 5: p. 213]

The multiple cutoff system assumes that compensation is not possible. Instead, this system assumes that there is a minimum level of each trait which a person must have in order to succeed on the particular job. Using the multiple cutoff system requires that a minimum value, a cutoff, be established for each predictor. In order for an applicant to be hired, he must be above the cutoff for every predictor. [Ref. 9: p. 184]

The advantages of the multiple cutoff technique are that there are no limiting assumptions and the method is easy to use. No formulas are involved in determining who passes and who fails. The major obstacle involves determining the cutting scores. Cutting scores are generally set by trial and error, with different ones set for each predictor. However, it is quite difficult to establish the validity of cutting scores with concurrent validation procedures when no one in the company hired with the method would have any scores below it. Thus, if it were felt that the cutoff were set too high, it would be difficult to assess the effect of lowering them on job performance. This restriction in range problem is not limited to just the multiple cutoff method, however; it effects all concurrent validity studies. [Ref. 5: p. 213 214]

***c. Multiple Hurdle***

In the multiple hurdle strategy, applicants must get satisfactory scores on a number of predictor variables (or hurdles) that are administered over time. The successful applicant is one who passes each hurdle and is thus ultimately hired. The multiple hurdle approach is not used very often. But when it is used, it is found most frequently in management training programs and in the military. First, people who meet certain

basic requirements are chosen to comprise a pool of applicants. The first hurdle is designed to eliminate the least qualified applicants. At various points in time, additional hurdles are presented. To survive in the program, applicants must pass each hurdle; those who do not are dropped along the way.

The advantage of the program is that unqualified people do not have to endure an entire evaluation program before they are rejected. It is best for both the company and the applicant to discover as soon as possible if he or she will not make it on the job. Because many evaluations are made, the company can be more confident in the quality of their final decision. The disadvantages of the method are the time and cost involved. [Ref. 5: p. 217]

*d. Profile Matching*

In this method, all the current employees take a number ( $k$ ) of predictor tests. Test scores are correlated with measures of job performance. Of the  $k$  tests that were administered, a subset of them ( $n$ ) would probably show relationships to job success or be valid predictors.

Two analyses are used to determine the degree of match between the applicant's profiles and the standard profile. What complicates the picture is that sometimes the two analyses yield different conclusions about whom to hire. One approach is to simply correlate the applicants' scores on the predictors with the average company scores and then hire the person whose scores correlate the highest. While this may seem sensible, there is one problem. Correlation is a measure of the degree of relationship between two variables. While two sets of scores may correlate highly, there may be vast differences in their magnitude. An applicant whose profile is similar to the standard but whose scores are well below it in terms of magnitude would appear to be a good candidate. Correlation reflects the similarity of the shape of the two profiles but not the degree of closeness. The second analytical procedure is to compute a measure of the differences between the applicants' scores and the standard scores. The difference ( $d$ ) is computed between each predictor and the standard. The differences are squared ( $d^2$ ) so that the positive and negative difference scores are added together. [Ref. 5: p. 217]

## 2. Selection Errors

### *a. Criterion Cutoff*

Criterion cutoff is the point that separates successful (above) from unsuccessful (below) employees. Again, management decides what constitutes successful and unsuccessful performance. Part (a) of Figure 4 shows a predictor-criterion relationship of about .80 where the criterion score has been separated by a criterion cutoff.

### *b. Predictor Cutoff*

Predictor cutoff is the point that separates accepted (right) from rejected (left) applicants. The score that constitutes passing the predictor test is determined by the selection ratio, cost factor, or occasionally, the law. Part (b) shows the same predictor-criterion relationship, except this time the predictor scores have been separated by a predictor cutoff.

### *c. Both Cutoff on a Predictor-Criterion*

Part (c) shows the predictor-criterion relationship intersected by both cutoffs. Each of the resulting four selections of the area is identified by a letter representing a different group of people:

(1) *Selection A.* Those applicants who are above the predictor cutoff and above the criterion cutoff are true positives. These are the people we think will succeed on the job because they passed the predictor test who in fact do turn out to be successful employees. This group represents a correct decision - We correctly decided to hire them.

(2) *Selection B.* The people in this group are those we thought would not succeed on the job because they failed the predictor test and who, if hired anyway, would have performed unsatisfactorily. This group represents a correct decision- we correctly predicted they would not succeed on the job. These people are true negatives.

(3) *Selection C.* Those people who passed the predictor test (and are thus predicted not to succeed on the job) but who would have succeeded had they been given the chance are called false negatives. We have made a mistake in our decision-making process with these people. They would really turn out to be good employees, but

we mistakenly decided they would not succeed. These are "the good ones we let get away."

(4) *Selection D.* Those people who passed the predictor test (and are thus predicted to succeed on the job) but perform unsatisfactory after being hired are called false positives. We have also erred with these people. They are really ineffective employees who should not have been hired, but we mistakenly thought they would succeed. They are "the bad ones we let in." Positive/negative refers to the result of passing/failing the predictor test; true/false refers to the quality (good/bad) of our decision to hire the person. In personnel selection, we want to minimize the false positives and false negatives. [Ref. 5: p. 203]

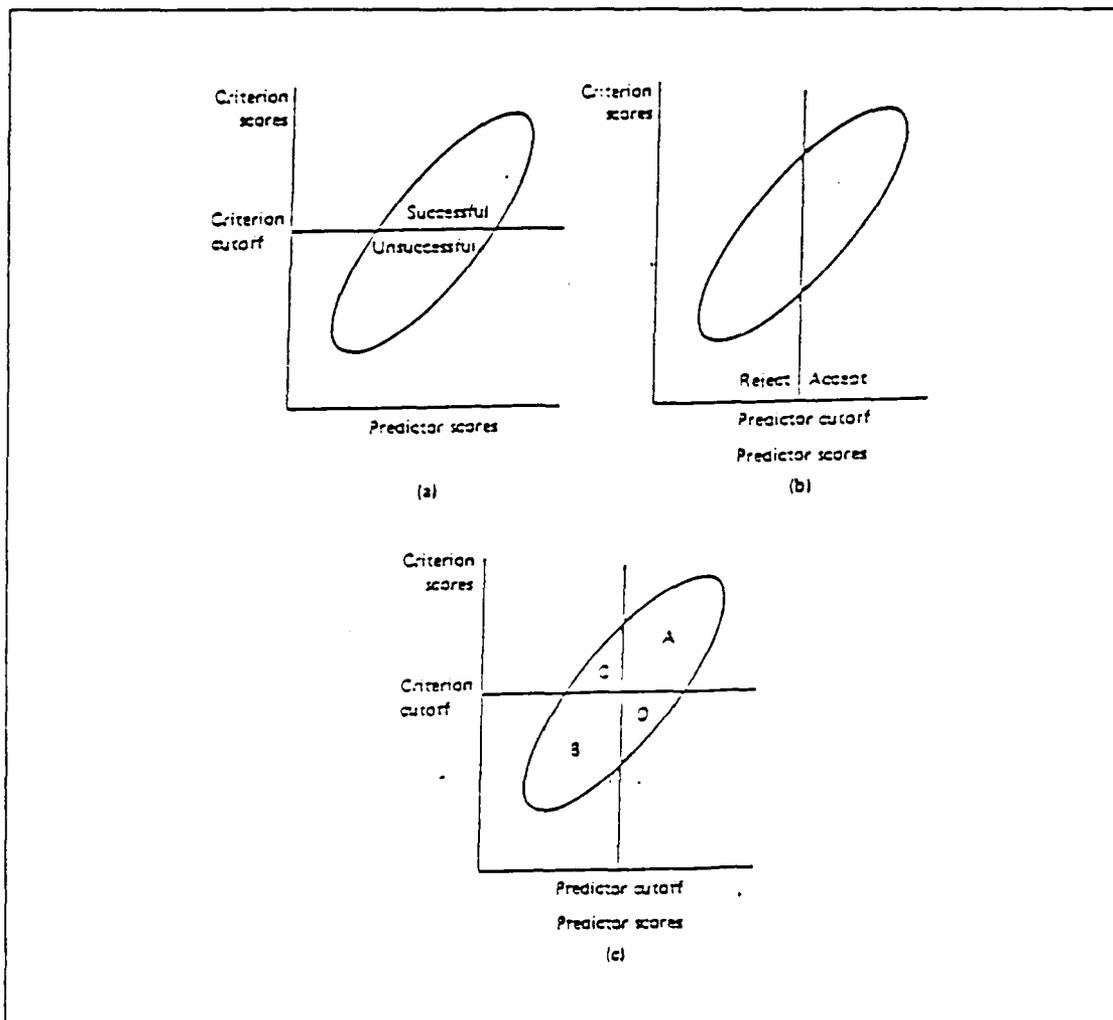


Figure 4. Effect of Establishing Cutoffs on a Predictor

Areas A and B represent correct decisions, because in both cases the predictor cutoff was confirmed by later job performance. That is, persons in area A were predicted to perform satisfactorily on the job and they did; persons in area B were predicted to perform unsatisfactorily on the job and they did. Individuals in areas C and D, however, were inncorrectly categorized. Those in area D were predicted to succeed on the job, but did not (some may have "washed out" in training), and those in area C were predicted to fail on the job, but they performed satisfactorily.

One index of decision-making accuracy, therefore, is the proportion of total decisions made that are correct decisions. In terms of Figure 4, such a proportion may be computed as follows:

$$PC_{tot} = \frac{A + B}{A + B + C + D} \quad (4 - 1)$$

where  $PC_{tot}$  is the proportion of total decisions that are correct, and A, B, C, and D are the numbers of individuals in each cell of Figure 4. The equation (4-1) takes into account all decisions that are made and, in addition, treats cells C and D (erroneous rejections and erroneous acceptances) as equally costly.

In many selection situations, however, erroneous acceptances are viewed as far more serious than erroneous rejections. The employment manager is generally more concerned about the success or failure of those persons who are accepted than about rejected applicants. Therefore, a more appropriate index of decision-making accuracy that are correct decisions:

$$PC_{acc} = \frac{A}{A + D} \quad (4 - 2)$$

where  $PC_{acc}$  is the proportion of those accepted who later turn out to be satisfactory, and A and D represent the total number accepted who are satisfactory and unsatisfactory, respectively. When the goal of selection is to maximize the proportion of individuals selected who will be successful, equation (4-2) applies. [Ref. 10: p. 249 250]

### **III. DESCRIPTION OF THE CURRENT SYSTEM**

#### **A. THE CURRENT SELECTION SYSTEM**

The Manpower Department foresees the future need of personnel for billets opening in each unit based on expansion of structure, transfer, retirement, and promotion. Throughout assignment for NPS students by the Department of defense, the Education Department recruits and selects the number of NPS candidates.

##### **1. Qualification**

The basic qualifications required to attend NPS are set forth as followed: must hold a rank of at least O-2 or O-3; Service record must be unblemished with no past record of non-judicial punishments; can not have been a significant time under hospital care; must have at least 3.0 in academic grade point average during undergraduate studies ; a comprehensive biographical background check must be conducted; and must not have past history of any unauthorized absence from appointed place and time.

##### **2. Application Screening**

The Korean Education Department screens the application reviewing the individual qualification and records. As a result, the candidates with insufficient qualifications and poor records are seperated

##### **3. Testing**

Testing consists of ECL (English Comprehension Level) test, Korean history, TOEFL (Test of English as Foreign Language), and major qualification test. The first three tests are common for all the NPS candidates. The major qualification test is different for each curriculum. The minimum required score for ECL test is 70. If a candidate does not receive the minimum score, he fails to get into the program whether he passes any other test. The remaining three tests are weighed equally. Currently, the Education Department requires candidates take a ECL, TOEFL, Korean history and major qualification test stimulanecously.

#### **4. Selecting Committee**

The test scores, past education record, past performance records, and committee interviews are all given a certain amount of weight to be considered into the program. Test score is 60 percent, past education record (including officer basic and service school) is 10 percent, Past performance is 20 percent, and committee interview is 10 percent. The interviewer's main focus toward the candidate is that he has spent his time in a career-enhancing duty. Also, it is a requirement that the candidate have a high degree of technical knowledge and a master degree.

The selecting committee tries to place the candidate according to his background. For instance, if the candidate is a communication officer, he would be ideal for the electric engineering curricula.

After all, the selecting committee selects two candidates. One will be the primary candidate and the other will be the alternate candidate. The primary candidate is required to take the ECL test at the Education Department of the U.S. 8th Army Corps in Seoul, Korea. The primary candidate must score a minimum of 85 on the ECL test. He is given two chances to pass the test. If unable to pass the test on his second try or if he failed the physical examination, the alternate candidate is given the ECL test and the physical examination.

The Education Department forwards the results of two of candidates to NPS and the candidates should receive admission from NPS. If the selectees do not receive admission from NPS and attain the minimum scores of the ECL test, they are skipped at the final selection.

#### **5. Training at the Military Language School.**

After the decision of the first selection, all the selectees should receive the English training course for six weeks. But, if the selectees are unable to take the English language course due to the completion of their careers, they are exempted from the English training course. In this case, they are responsible for increasing their English ability and preparing for the formal ECL test on their own.

### **B. PROBLEMS**

Presently, manpower planning has some problems in determining the selection students for NPS. These are the inadequate forecast of present and future total needs of

overseas education. Also, the selection process has some problems in determining who attends and what curricula they will study. The majority of students are all in limited curricula and occupational codes. This often excludes some occupational codes. Other vital curricula are under-represented. This policy limits the exposure of a wide variety of officers to various important curricula that could play a key role in the effectiveness of the Korean Navy.

The following are some specific problems:

**1. Inadequate assignment for NPS students (Navy) by DoD**

The Korean Department of Defense (DoD) has not sufficiently balanced out the ratio of its military manpower assigned to the NPS Based on five years from 1983 to 1987. The Navy is far lower than the Army or Air Force. As Table 1 indicates, Army students during the five years totaled ninety, Air Force totaled for forty-three and Navy totaled thirty-six.

**Table 1. KOREAN STUDENTS WHO GRADUATED IN NPS**

YEAR	Army	Navy	Air Force	Total
83	17	10	4	31
84	26	8	10	44
85	17	7	8	32
86	16	5	11	32
87	14	6	10	30
Total	90	36	43	169

**2. Inadequate Assignment for Each Curriculum**

Most of the officers in NPS are assigned to the technical curricula such as Weapon Science and Electric Engineering. Other important curricula such as Administrative Science, Computer Science, and Information Science are poorly represented. As a result, most officers become expert in the technical fields, but are not well prepared in

management and organization. The Korean Navy will benefit technically, but its management and organizational skills will not keep pace. (See Table 2.)

**Table 2. CURRICULUM OF KOREAN NAVY IN ATTENDING NPS BY YEARS**

CURRICULA	83	84	85	86	87	TOTAL
Administrative Science	1	2		1		4
Computer Science		1		1		2
Operations Research	2		1	2	1	6
Information Science		1				1
Weapon Science		2	1		2	5
Electrical Engineering	3	1	3	1	3	11
Oceanographic	2					2
Mechanical Engineering	1		2			3
Engineering Acoustics	1	1				2
TOTAL	10	8	7	5	6	36

### **3. Inefficient Assignment for Each Branch of Service**

The specific branches of the Korean Navy are not well represented in NPS. Despite the fact that the line officers make up two-thirds of the total number of officers in the Navy, currently there are few line officers attending the school. Other specialty fields such as supply, financial, are not represented at all. Also, other fields such as intelligence, aviation are little represented. Only those highly technical fields such as Communications, Engineering, and Weapon Systems are well represented. (See Table 3.)

This inefficient assignment for each branch of service may cause undesired morale consequences for those officers who really have the desire and greater potential of becoming competent officers, and those who at least think they might have deserved the opportunity but that their career pattern did not provide them the chance.

**Table 3. OCCUPATIONAL CODE OF KOREAN NAVY OFFICERS IN ATTENDING NPS**

BRANCH	83	84	85	86	87	TOTAL
ENGINEERING	2	2	2		1	7
INTELLIGENCE	1					1
COMMUNICATION	2	2	2		2	8
SURFACE-WARFARE	2	1		1		4
COMPUTER			1	2		3
EDUCATION	2	1	1	1	1	6
WEAPONS		2	1	1	2	6
AVIATION	1					1
TOTAL	10	8	7	5	6	36

**Table 4. CROSS-TABULATION BY CURRICULA**

BRANCH	AS	CS	OR	IS	WS	EE	OG	ME	EA	TOTAL
ENGINEERING	2		1	1		1		2		7
INTELLIGENCE							1			1
COMMUNICATION		1				7				8
SURFACE WARFARE	2		1						1	4
COMPUTER		1	2							3
EDUCATION			2			2		1	1	6
WEAPONS					5	1				6
AVIATION							1			1
TOTAL	4	2	6	1	5	11	2	3	2	36

Curricula such as Administrative Science would be beneficial to those fields not currently represented. Also, each branch of the Navy has been sending their officers to only one or two of the specific curricula. For example, the line officers have only few a

option, Administrative Science , Operations Research, and Engineering Acoustics. They are not allowed to study any other curricula although they are fully qualified to do so. (See Table 4.)<sup>1</sup>

#### **4. Inadequate and Insufficient English Education**

The Naval officers, who are assigned to NPS for two years, are usually inadequately prepared in their English language skills. Prior to taking the formal ECL test, all candidates are required to receive a six-week English training course. The six-week English training they receive prior to coming to NPS is inadequate. Also, many senior line officers do not let the young line officer candidates take this important course. Their reasoning is that the young officers are needed to perform military duties. As a result, the failure-rate for the line officers in the ECL test is a lot higher than the other officers of other services. Also, the ECL test and TOEFL test given to each student do not reinforce the student's ability to understand the requirements set forth by the NPS. The ECL test only tests the listening and reading portion of the English language. The TOEFL test tests the grammar portion of the English language. But neither test addresses the composition and talking portion of language.

#### **5. The Shortage of Line Officer Recognition for Education**

There is distinct evidence that coming to the NPS is disadvantageous for many Korean line officers. Many senior officers do not see U.S education as beneficial to the service. They would rather have the young officers spend more time on the ships in operational duties. Many of the senior officers have never received postgraduate education, and they feel resentful toward the young officers who do receive education. As a result, many qualified young line officers intentionally fail or do not take the exams which would bring them to the U.S. This results in a pool of highly intelligent officers spending their time on the ships instead of furthering their education.

#### **6. Inefficient Interview (Committee)**

Prior to coming to NPS, all officers must be interviewed. This interview, along with exams, qualify the officers for the program. The members of the interview com-

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<sup>1</sup> Curricula Code are following; AS: Administrative Science, CS: Computer Science, OR: Operations Research, IS: Information Science, WS: Weapon Science, EE: Electrical Engineering, OG: Oceanographic, ME: Mechanical Engineering, EA: Engineering Acoustics.

mittee hold a powerful positions, but many of them are not qualified in the subjects for which they are interviewing. For instance, an officer being interviewed for a MPTA (Manpower, Personnel Training and Analysis) course probably will have a single interviewer with only little knowledge of the subject.

#### **7. Inefficient Past Performance Appraisal**

Actually, the requirements to come to the NPS do not take into account an officer's past performance. Sometimes, past performance appraisal depends on selection committee and senior officer's power instead of actual past performance. As a result, an officer with a poor past performance may be able to take the exam and qualify for the program. An officer with a poor performance record probably will not get promoted, but if he was to get into the program his future might look brighter. This is due to the fact that after two years in the NPS, the officer will owe four years of obligation. That is six years of service which he probably would not have gotten.

To increase efficiency from the overseas education, the problems of the current system must be identified from the analysis of the current system and eliminated through redesigning the selection.

## IV. ANALYSIS

### A. ANALYSIS

#### 1. Data

The data used in this thesis are from the "Record of Korean Navy students who graduated from the NPS between 1983 and 1987". These data include NPS grade, Naval Academy grade, ECL testing score, TOEFL testing score, each curriculum of NPS, and branch of service. SPSSX will be used to conduct the analysis (See the Appendix A).

Grade average at NPS is a good criterion for evaluating the selection process. Also, English is a very important factor in learning at NPS for foreign students. This analysis attempts to determine a model for the prediction of this criterion from the English Comprehension Language test (ECL test), Naval Academy grade (NA grade), and a Test of English as Foreign Language (TOEFL test).

#### 2. Regression Analysis

The relationship between correlation and regression is the foundation for the relationship between multiple correlation and multiple regression. Multiple regression permits prediction on the basis of multiple predictors. Suppose we have criterion data on NPS grade (average) and predictor data on the NA grade (average), ECL testing score, and TOEFL testing score that we think may be useful for selecting future students. The regression equation is the following:

$$\hat{Y} = -.8 + .011X_1 + .319X_2 + .025X_3$$

where

$\hat{Y}$  = Performance in NPS (NPS grade),

$X_1$  = NA grade,

$X_2$  = ECL Testing Score,

$X_3$  = TOEFL Testing Score.

The degree of predictability afforded by the three predictors is measured by the multiple correlation between the predictors and the criterion. If the multiple correlation

is large enough to be of some value for prediction purposes, we might use the three predictors to select NPS students.

As indicated Table 5, the multiple R square is 0.693. Also, the NA grade and ECL testing score are significant at the 0.01 level. The TOEFL testing score is significant as predicted at the 0.1 level. Therefore, the NPS grade has a linear relationship with NA grade, ECL testing score, and, to a smaller extent, TOEFL testing score.

Table 5. REGRESSION RESULTS

VARIABLE(S) ENTERED ON STEP NUMBER					
1..	TOEFL	TEST OF ENGLISH AS A FOREIGN LANGUAGE			
2..	NAG	NAVAL ACADEMY GRADE			
3..	ECL	ECL SCORE			
MULTIPLE R					
			.83260		
R SQUARE					
			.69322		
ADJUSTED R SQUARE					
			.66446		
STANDARD ERROR					
			.12527		
ANALYSIS OF VARIANCE					
		DF	SUM OF SQUARES	MEAN SQUARE	
REGRESSION		3	1.23473	.37824	
RESIDUAL		32	.50217	.01569	
F =	24.10273	SIGNIF F =		.0000	
----- VARIABLES IN THE EQUATION -----					
VARIABLE	B	SE B	BETA	T	SIG T
TOEFL	.010804	.005797	.245702	1.864	.0716
NAG	.319243	.115645	.548625	2.761	.0095
ECL	.025149	.008663	.383004	2.903	.0066
(CONSTANT)	-.300463	.546903		-1.464	.1530

### 3. Correlation Coefficient

The correlation coefficient is a statistical indicator of the linear relationship between predictor and criterion scores. In a validation study, it is also called the validity coefficient.

This statistic summarizes the degree of linear association. The values of a correlation coefficient range between +1.00 and -1.00. A correlation of +1.00 represents a perfect positive relationship and indicates that if you know the value of one variable, the exact value of the other variable can be determined. A correlation of zero indicates that no linear relationship exists, and a correlation of -1.00 represents a perfect negative correlation between two variables.

The criterion is the NPS grade and the predictors are Naval academy grades, the ECL testing scores and TOEFL testing scores.

The Naval Academy grade has a strong relationship with the NPS grade ( $r=0.706$ ), and the ECL testing score also has a strong relationship with NPS grade ( $r=0.732$ ). Also, the TOEFL testing score has a strong relationship with NPS grade ( $r=0.679$ ). (See Table 6.)

Table 6. CORRELATION COEFFICIENT BETWEEN CRITERION AND PREDICTORS.

	NPSG	ECL	NAG	TOEFL
NPSG	1.000	0.732	0.706	0.679
ECL	0.732	1.000	0.568	0.615
NAG	0.706	0.568	1.000	0.567
TOEFL	0.679	0.615	0.567	1.000

### 4. Expectancy Charts

Expectancy charts are an alternative to the correlation coefficient as a means of showing a test's validity. An expectancy chart shows what percentage of Koeran Naval students in each testing score category will meet a certain level of job performance. Expectancy charts provide a method for interpreting testing scores in terms of the

probability of successful performance. Each bar on an expectancy chart shows what percentage of the Korean Naval students in a given predictor category are successful. Valid predictors typically produce expectancy charts with long bars for high predictor scores and short bars for low predictor scores as illustrated in Figures 5, 6, and 7. The data from which the expectancy charts in Figures 5, 6, and 7 were derived are shown in Tables 7, 8, and 9.

Although expectancy charts show the same information that is reported by a validity coefficient, expectancy charts are more useful in counseling candidates since most candidates do not understand correlation coefficients. Expectancy charts have one major advantage over the correlation coefficient as a means of expressing test validity: They are not limited to linear predictor-criterion relationships.

Assume that those officers who attained above 3.3 in NPS grade are considered successful in academic performance rated by the Education Department.

Figure 5 displays the relationship between ECL testing score and the percentage of students graduating from NPS with a grade above 3.3. Those who are above an ECL test scoring between 89-90 have 100 percent probability of getting above an NPS grade of 3.3. Twenty five percent of students scoring between 85-88 have a probability of getting above an NPS grade of 3.3. Seven percent of students scoring between 82-84 have a probability of getting above an NPS grade of 3.3. Also, zero percent of students scoring between 80-81 have a probability of getting above an NPS grade of 3.3.

As Table 6 indicates, the probability of getting above an NPS grade of 3.3 is 50 percent for those who are above ECL testing score of 85.

Figure 6 displays the relationship between NA grade and the percentage of students graduating from NPS with a grade above 3.3. Those who are above an NA grade ranging between 3.45-3.85 have 100 percent probability of getting above an NPS grade of 3.3. Sixty seven percent of students scoring between 3.30-3.44 have a probability of getting above an NPS grade of 3.3. Nine percent of students scoring between 3.15-3.29 have a probability of getting above an NPS grade of 3.3. Also, six percent of students scoring between 2.75-3.14 have a probability of getting above an NPS grade of 3.3.

As Table 8 indicates, the probability of getting above an NPS grade of 3.3 is 85 percent for those who are above NA grade of 3.3.

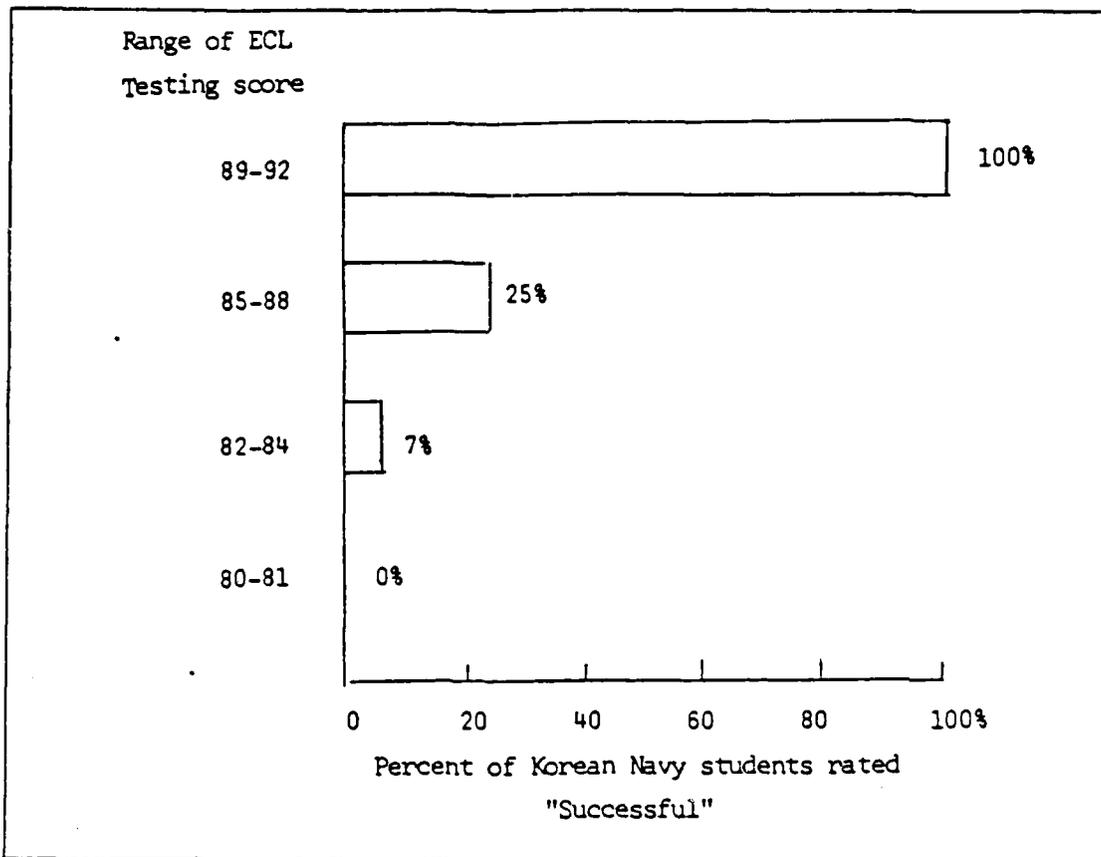


Figure 5. Expectancy Chart of ECL Testing score

Table 7. EXPECTANCY TABLE OF ECL TESTING SCORE

ECL Testing scores	No of successful	No of fail	Percent who were successful
89-92	6	0	100%
85-88	2	8	25%
82-84	1	15	7%
80-81	0	4	0%

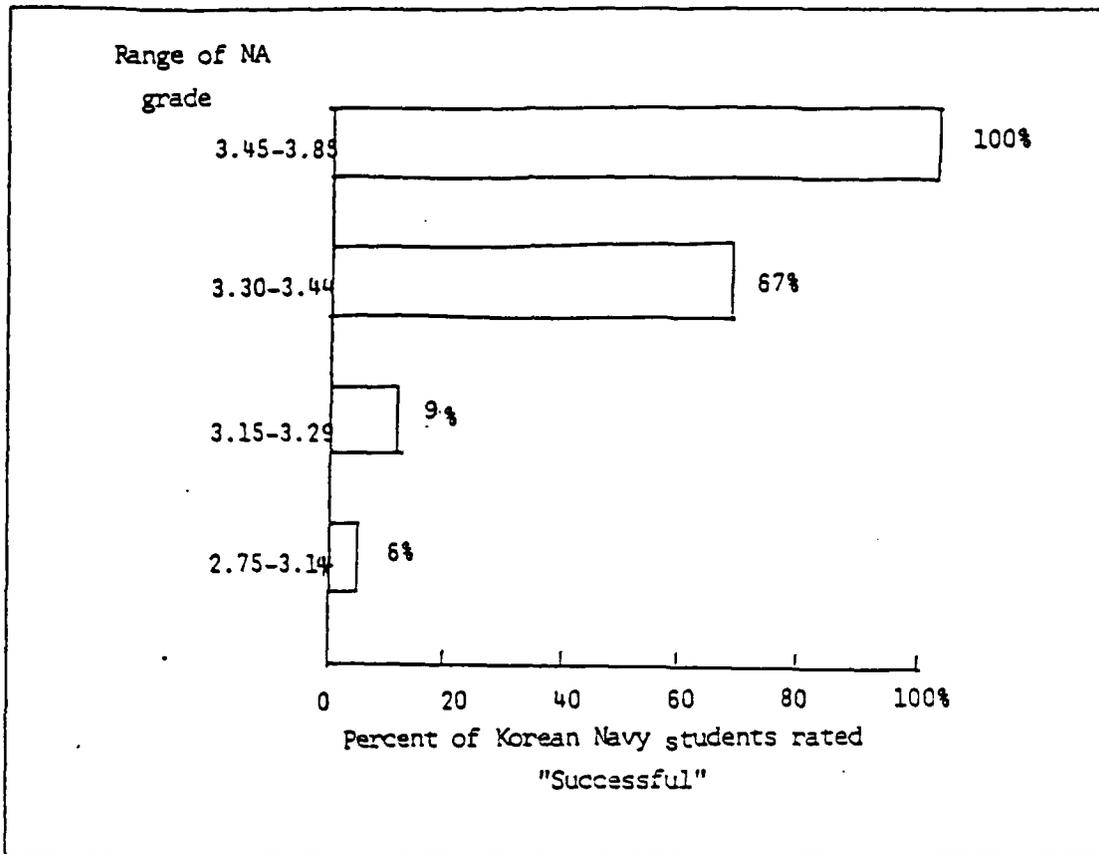


Figure 6. Expectancy Chart of NAG

Table 8. EXPECTANCY TABLE OF NAG

NA grades	No of successful	No of fail	Percent who were successful
3.45-3.85	5	0	100%
3.30-3.44	2	1	67%
3.15-3.29	1	10	9%
2.75-3.14	1	16	6%

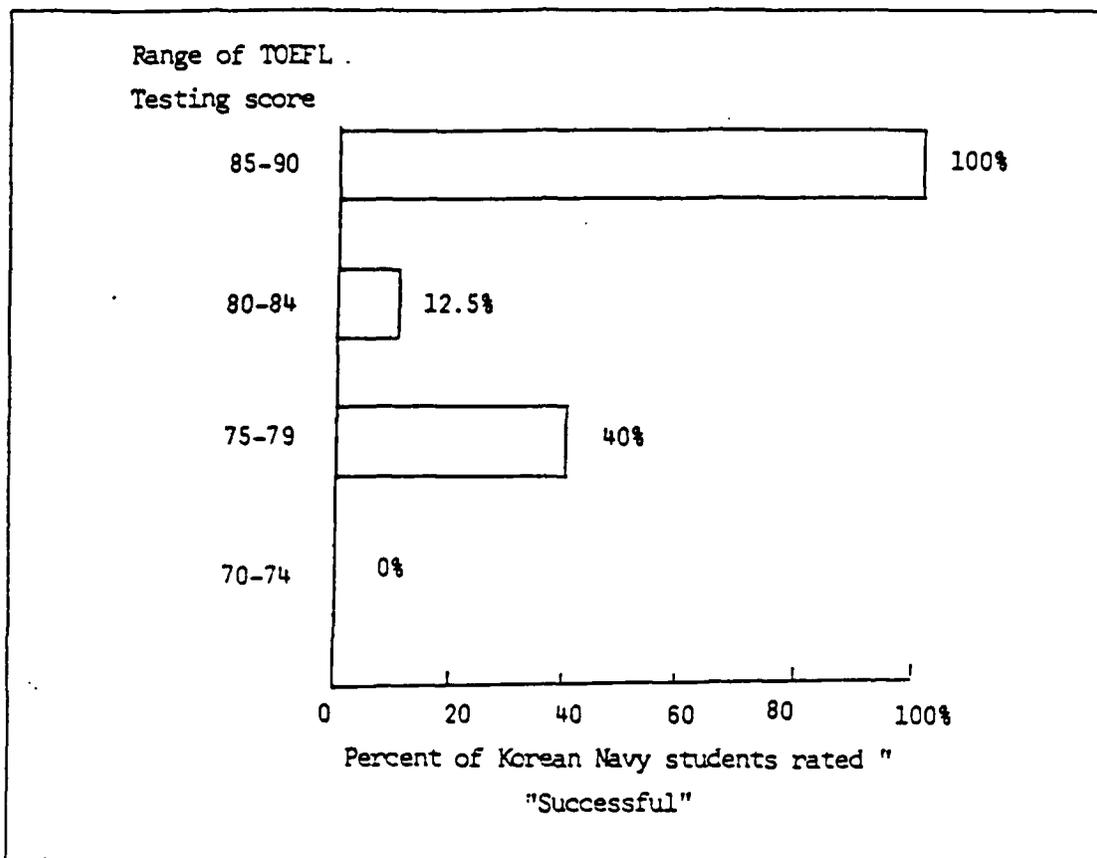


Figure 7. Expectancy Chart of TOEFL Testing Score

Table 9. EXPECTANCY TABLE OF TOEFL TESTING SCORE

TOEFL testing scores	No of successful	No of fail	Percent who were successful
85-90	5	0	100%
80-84	2	16	12.5%
75-79	2	5	40%
70-74	0	6	0%

Figure 7 displays the relationship between TOEFL testing score and the percentage of students graduating from NPS with a grade above 3.3. Those who are above a TOEFL test scoring between 85-90 have 100 percent probability of getting above an NPS grade of 3.3. Twelve and one-half percent of students scoring between 80-84 have a probability of getting above an NPS grade of 3.3. Forty percent of students scoring between 75-79 have a probability of getting above an NPS grade of 3.3. Also, zero percent of students scoring between 70-74 have a probability of getting above an NPS grade of 3.3.

As Table 9 indicates, the probability of getting above an NPS grade of 3.3 is 35 percent for those who are above a TOEFL testing score of 80.

##### 5. The Outcomes of Predictions.

The multiple regression equation gives rise to a continuous distribution of predicted outcomes,  $y$ , which are "cut" at some point as a practical method of making personnel decisions. The distribution of actual criterion performance (when available) is similarly cut at some point to enable a distinction between "successful and unsuccessful" performance. The joint frequency distribution with probabilities of predicted and actual criterion scores is presented in Figure 8.

Four possible outcomes of prediction may be delineated. When success is predicted and success results, we refer to the individuals so classified as valid positives (VP). When success is predicted and failure results, we speak of false positives (FP). When failure is predicted and failure occurs, we have a group of valid negatives (VN). And finally, when failure is predicted but success occurs, we are dealing with false negatives (FN).

The total number of predicted positives,  $P'$ , may be calculated from:  $VP + FP$ . Similarly, the total number of predicted negatives,  $N'$ , is given by:  $FN + VN$ . Also, the number of "actual positives",  $P$ , that exist in the total sample may be calculated from:  $P = FN + VP$ . Similarly, we may calculate the number of "actual negatives,"  $N$ , that exist in the total sample from:  $N = VN + FP$ .

To facilitate comparison of prediction outcomes in samples of varying size, it is preferable to express frequencies as simple probabilities or proportions of the total size. One does so by dividing the frequency of a given outcome by the total number of people in the sample. Thus the probability of occurrence of a valid positive is given by:

$P(VP) = VP/(P + N)$ . This probabilistic representation of the outcomes of test prediction is given in Figure 8. [Ref. 11: p. 242-243]

The row and column totals of Figure 8 are also expressed as probabilities. Because these marginal totals are of critical importance in the evaluation of test predictions, they have been given special names. The probability or proportion of actual positives that exist in the total sample of applicants is called the base rate (BR). This probability may be calculated directly [ $BR = P/(P + N)$ ] or from the probabilities of two outcomes [ $BR = P(FN) + P(VP)$ ]. The expression "base rate" usually has reference to the base rate of the positive class. The probability or base rate of failure in the total sample is given by the expression:  $1 - BR$ .

		Total		
Criterion standard $y$	↑	Probability of false negatives $P(FN) = FN/(P + N)$	Probability of valid positives $P(VP) = VP/(P + N)$	Probability of actual positives $BR = P/(P + N)$
	↓	Probability of valid negatives $P(VN) = VN/(P + N)$	Probability of false positives $P(FP) = FP/(P + N)$	Probability of actual negatives $(1 - BR) = N/(P + N)$
Total		Probability of predicted negatives $(1 - SR) = N'/(P' + N')$	Probability of predicted positives $SR = P'/(P' + N')$	
		↓		
		$y$		
		Cutoff on predictor		

Figure 8. Outcomes of Test Predictions

The probability or proportion of predicted positives among the total sample of applicants is called the selection ratio (SR). This probability may be calculated directly [ $SR = P'/(P' + N')$ ] or from the probabilities of two outcomes [ $SR = P(VP) + P(FP)$ ].

The importance of these two marginal probabilities, base rate and selection ratio, cannot be overemphasized. Also, the probability of accuracy of prediction may be calculated from  $P(VP) + P(VN)/(P + N)$ . [Ref. 11: p. 244]

Assume that the dashed horizontal line in the diagram represents a dividing line.: Those individuals rated at or above this line (NPS grade 3.3) were considered successful in the NPS as predicted by the Korean Navy Education Department; those rated below the line were considered not successful. The vertical line represents the cutting point on NA grade, ECL testing score and TOEFL testing score when individuals scoring above this point would be selected (in the future) and those scoring below the point would be rejected. These two lines allow the division of the diagram into four quadrants. (See Figures 9, 10, and 11.)

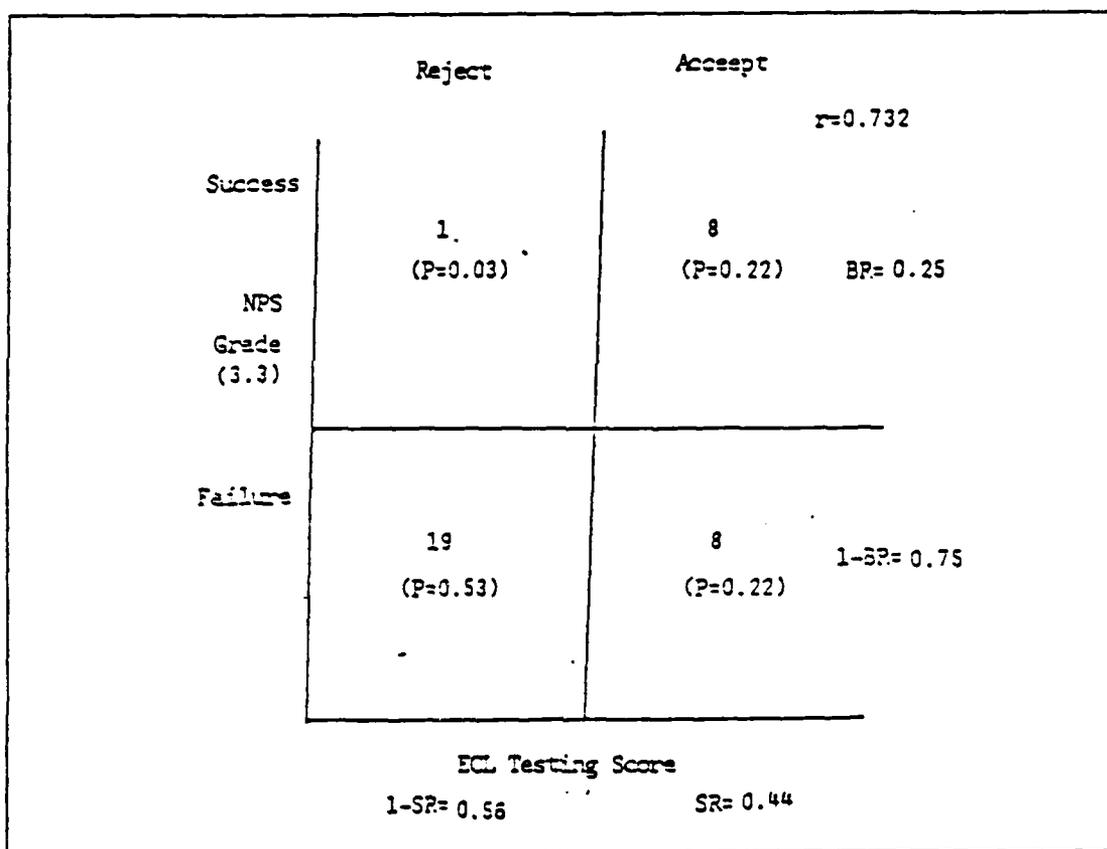


Figure 9. Outcome of ECL Testing Score

As Figure 9 indicates, with  $r=0.732$ , the accuracy of predictions is 0.75 and the base rate is 0.25.

That is, 75 percent of the predictions made using the test were correct. This seems to be fairly impressive evidence in favor of the test. This is the proportion of applicants who would succeed on the NPS if the ECL test was not used to select them. The accuracy of the predictions made using the test was .75 compared to a base rate of .25. Thus, the use of the selection system represents a gain in the accuracy of predictions made compared with using no selection test.

The selection ratio is the proportion of individuals actually selected to those who applied. This would represent a selection ratio of 0.44 percent in Figure 9.

	Reject	Accept	
Success	2 (P=0.05)	7 (P=0.2)	$r=0.706$
NPS Grade (3.3)			BR=0.25
Failure	26 (P=0.72)	1 (P=0.03)	1-SR=0.75
	NA Grade		
	1-SR=0.77	SR=0.23	

Figure 10. Outcome of NA Grade

As Figure 10 indicates, with  $r = 0.706$ , the accuracy of predictions of NA grade for NPS grade is 0.83 and the base rate is 0.25. Also, the selection ratio is 0.23, and the success rate is 0.87.

As Figure 11 indicates, with  $r=0.679$ , the accuracy of predictions of TOEFL testing score for NPS grade is 0.50 and the base rate is 0.25. Also, the selection ratio is 0.64, and the success rate is 0.56.

		Reject	Accept	
NPS Grade (3.3)	Success	2 (P=0.05)	7 (P=0.2)	$r=0.679$ BR= 0.25
	Failure	11 (P=0.31)	16 (P=0.44)	1-BR= 0.75
		TOEFL Testing Score		
				1-SR= 0.36      SR= 0.64

Figure 11. Outcome of TOEFL Testing Score

Throughout the analysis of these predicted outcomes, the effective cutting score to increase the NPS performance should be a score of 85 or more on the ECL test, above 3.3 on the NA grade, and a score of 80 or more on the TOEFL test.

#### 6. Taylor-Russell Tables

It is possible to compute the improvement in the quality of the work force by using a certain predictor if we know (1) its validity, (2) the selection ratio, and (3) the percentage of present employees who are successful. It is also possible to compute the additional improvement in work force quality if test of greater validity is used or if the selection ratio is lowered. This information is a given in the Taylor-Russell tables (Taylor

& Russell, 1939). The Taylor-Russell tables list the percentage of employees hired who will be satisfactory under different combinations of test validity, selection ratio, and percentage of present employees considered successful. [Ref. 5: p. 231]

Throughout the Taylor-Russell Table, the accuracy of prediction for the NA grade, ECL testing score, and TOEFL testing score would be calculated.

The value of a prediction system varies as function of three basic variables:

1. The magnitude of the validity coefficient - As validity increases, so does the value of the system.
2. The base rate - As the base rate approaches 50 percent, the selection system demonstrates greater value.
3. The selection ratio - As the selection ratios become smaller, the value of a selection increases. [Ref. 12: p. 37]

## **B. SELECTION STRATEGIES FOR NPS CANDIDATES**

### **1. The Multiple Regression and Multiple Cutoff Methods.**

These methods can be used in combination. This can take the form of not hiring some people unless their predicted criterion score was above a certain level (from the multiple regression strategy) and they were above some cutoff on each predictor (from the multiple cutoff strategy). These techniques work best when the selection ratio is low and there are many applicants. Large numbers of applicants are needed because many will be rejected for one of two reasons: (1) They fell below the cutoff on one or more predictors, or (2) even though they were above each individual cutoff, their predicted criterion performance was not high enough. This combined approach is often used in selecting students for graduate school. Applicants usually must have minimally acceptable quantitative and verbal ability as well as an acceptable predicted grade-point average in graduate school (a frequently used criterion of success in academia). [Ref. 5: P. 255]

For the multiple cutoff method, the effective cutting score to improve the NPS performance should be a score of 85 or more on the ECL test, above 3.3 on the NA grade, and a score of 80 or more on the TOEFL test.

The NA grade, ECL testing score, and TOEFL testing score are important for predicting the NPS performance:

$$\hat{Y} = -.8 + .011X_1 + .319X_2 + .025X_3$$

where  $\hat{Y}$  = Performance in NPS (NPS grade),  $X_1$  = NA grade,  $X_2$  = ECL Testing Score,  $X_3$  = TOEFL Testing Score.

If candidates receive high enough values of  $\hat{Y}$ , they will be selected.

If the candidates fall within a score of 85 or more on the ECL test, above 3.3 on the NA grade, and a score of 80 or more on the TOEFL test, and if (as a first selection step)

$$\hat{Y} = -.8 + .275(3.3) + .319(85) + .025(80) = 29.2,$$

they are the most desirable selectees and offer the highest potential to achieve high NPS performance.

If the number of candidates chosen by this method are under the required number, a different multiple cutoff strategy or multiple regression equation should be applied to select the NPS candidates.

### C. FACTORS CONSIDERED IN SELECTING NPS CANDIDATES

#### 1. Making the Selection Organization-wide

This is a necessary factor because it gives an equal opportunity to every eligible and willing officer to apply for NPS education and it also increases the organization's possibility of making a better choice among the available officers. This factor can also decrease or even eliminate the resentments of those groups of officers who under the present system may believe they are deprived from a good career pattern --not being in the right place at the right time.

#### 2. Education Background

The educational background of the candidates does not necessarily need to be an outstanding one. But, it must show at least a steadily successful scholar, able to succeed in advanced educational program of NPS. For example, strength in Mathematics and English will certainly increase the individual's chances of acquiring the analytical

ability and in learning the quantitative methods of problem solving which necessary for today's officer in technical profession

### **3. Rank**

It was seen before that current policy of selecting the officers among the ranks of Lieutenant and Lieutenant Junior Grade is most beneficial to the organization.

### **4. Past Performance**

As emphasized in any organization and especially in the military in differentiating individuals for a privilege, the record of past performance takes an important role. Of course the current selection procedure takes into account the past performance, but only as a determining standard and not as a differentiating factor among otherwise equally suitable candidates. This is because of the general structure of the present selection system that does not allow for centralizing and harmonizing the measurement of factors and for against one another.

### **5. The Selection Committee**

The members of the selection committee is required mature and experienced officers having experience in a variety of jobs and they should preferably represent different function of the organization at the time of selection. Among the members there ought to be officers with a good deal of experience. The members of the committee are helped by an officers' detailer and representative from the Education Department expert in NPS education. The task of the selection board is so crucial for good results that there is no need for overemphasizing the necessity of selecting really capable officers as its members.

### **6. Equal Selection Opportunity**

Those officers who really have the desire and a greater potential for becoming component officers are occasionally overlooked by the Education Department because of poor communication systems. Therefore, Communication with qualified officers is necessary as it increases opportunity to eligible and willing officers to apply for NPS education and also increase the organization's possibility of making a better choice of available officers.

The current system of placing certain branches of the Navy with specific curriculum must be overhauled. The officers should be placed in the curriculum of their choice and abilities. Also, more line officers must realize that furthering the education of their young officers is just as important as spending their time on the things a well-rounded and educated officer corps will provide more for the nation

#### **7. The "Whole Person Concept"**

The "whole person " concept should be considered when matching people and jobs. When the personnel department selects candidate, the whole person is selected with all of the strengths and weaknesses, judgments and foibles, personal problems and failures, and the motivation to work, as well as the nonproductive tendencies which are found in all people. Empirical evidence shows that it is impossible to separate the positive factors that lead to productivity in an individual from the negative elements that result in a lack of productivity. However, candidates , when properly motivated, may compensate for their weaknesses by concentrating on, and developing, their strengths, in which case they should become more effective candidates.

#### **8. Good Career Development**

For NPS graduate the Korean Navy should provide good career development such as promotion and good jobs. If the returning graduates are rewarded with accelerated promotion and improved performance marks more officers will try to get into the program. As a result, the overall standards of the NPS graduates will improve and more highly-educated personnel will emerge. Also, excellent candidates will apply to NPS. The Korean Navy will definitely benefit from this and the future will be bright.

## V. NEW MODEL

### A. ASSUMPTION

#### 1. Equal Selection Opportunity

For all branches of service the Navy education department gives equal selection opportunity. That is, with limited space (students), the Navy education department distributes for each curriculum and each service equally.

#### 2. Change in English Education

The period of language training is too short. It is very difficult for Korean officers to have spare time to increase their English language ability during regular duty time. Also, the form of ELC testing is centered upon listening ability. But speaking, comprehension, and writing ability as well as listening ability are also important to the Korean students. So, The English training school should change its education system (including the education time period).

#### 3. Good Career Development for NPS Graduates

Presently, the NPS graduate does not have a good career development in the Korean Navy. Therefore, many excellent officers do not apply to NPS a key step in their future. For good career development, NPS graduates must show good performance in NPS.

### B. NEW MODEL

In order to meet the NPS selection objective, several factors have been combined to form the primary determiners of the effectiveness of the NPS selection process in our Navy. (See Fig 12.)

#### 1. Manpower Resources Planning

Prior to seeking information about individuals, the organization must determine the numbers and kinds of people required and where they are to be placed. Because or-

ganizations must adapt to changing conditions (such as growth, new technology, and market variations), human resources planning is a continuing operation.

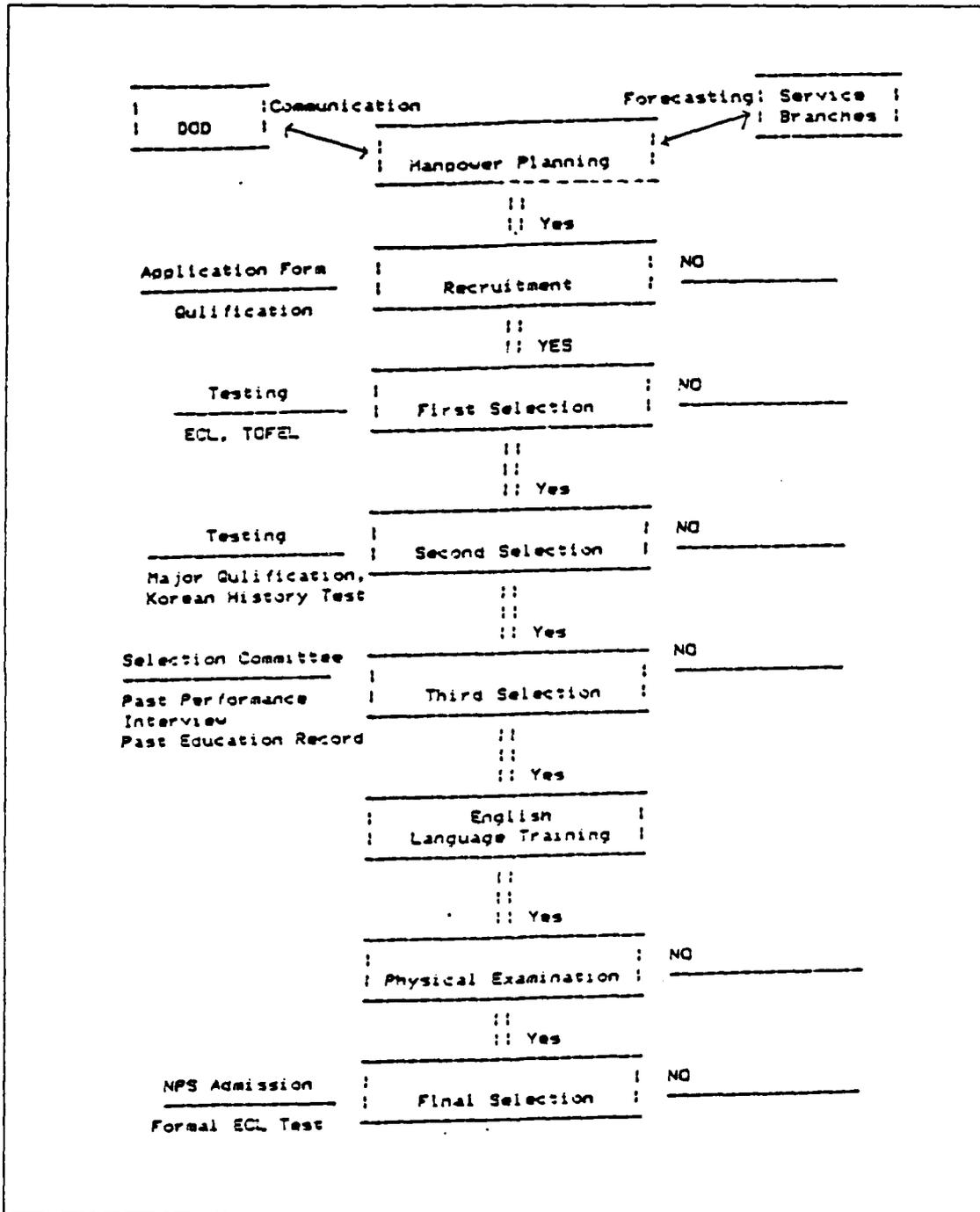


Figure 12. New Selection Model of Korean Navy Selection Process for NPS

As Schneider (1) observes, three kinds of analyses are required, namely organizational, staff, and job.

Organizational analysis provides information on the environment in which the organization exists. As the environment changes, so must the organization. Changes in organizational structure, in jobs, and even in organizational goals may be a consequence. In turn, the kinds of people necessary to accomplishing organizational objectives can be affected. The impact of automation on many organizations is an example.

Jobs are organizational entities. They must be designed to facilitate accomplishing organizational goals. The responsibilities and duties of each job, which are reflected in the tasks performed, determine the knowledge, skills, and abilities people must bring to a job in order to accomplish its objectives. Thus analyses of jobs are essential to determine an organization's personnel requirements.

Finally, staff analysis is essential. An organization must have current information on its own people. A comprehensive personnel record system accompanied by analyses of the data available from the system can yield information pertinent to many selection decisions, especially those involving promotions, transfers, demotions, and terminations. Furthermore, deficiencies in the human resources of an organization can be identified, as well as how to correct such deficiencies through training programs, recruitment from outside the organization, and other possible means. [Ref. 12: p. 20]

The Department of Defense and the Navy Manpower Department do not interact or coordinate with each other. As a result, the curricula requested by the Navy are assigned to different branches of the Army and Air Force. Also, those curricula not requested by the Navy are assigned to the Navy manpower Department by the DoD. The Navy Manpower Department must find out what curricula are requested by the branch of the Navy and then coordinate with the DoD to gain those curricula. Currently, the Korean Navy continues to send its officers to the technically oriented curricula according to specific designation and general curricula such as Administrative Science are over-looked. The technical curricula have received attention over many years, and other curricula have continued to be neglected. In order to bring all the curricula into an equal level, a system must be initiated where each year different curricula should curricula should be stressed. For instance, one year the curricula are stressed, then in the next year other curricula are stressed.

## 2. Recruitment

Recruitment following the traditional model focuses on locating people who have the abilities to perform the jobs for which they applied. That such jobs may not meet the needs of people hired for them is given little if any consideration. Once employed, such people may become dissatisfied and leave the organization, frequently after very short service. This is costly to the organization, especially if extensive training is involved.

In contrast, realistic recruiting seeks to give the prospective employee information concerning both the favorable and unfavorable aspects of the position for which an offer of employment is to be made. The prospective employee then has the option of deciding whether or not the position is acceptable. Studies of realistic recruiting have produced results beneficial to a number of organizations applying the approach. [Ref. 12: p. 21]

Recruitment is the term applied to that phase of personnel management which is concerned with reaching out and attracting a supply of people from which to select qualified candidates for job vacancies. An effort is thus made to attract potential employees with the necessary characteristics and in the proper quantities for the jobs available. An effective and systematic method of recruitment will minimize the cost of selection and training result in an efficient work force; an ineffective method will result in wasted manpower. [Ref. 9 p. 244]

The primary goal of recruitment is to provide a sufficiently large pool of candidates from which to select qualified NPS students. If applicants do not provide the necessary information documenting their minimum qualification, they are not given any further consideration - they are not permitted to take the formal examination.

### *a. Application Form*

The Education Department should be cautious when eliminating individuals based on minimum qualifications derived from the application form. Any minimum qualifications must be job-related and based on sound job analysis.

### *b. Qualification*

Currently, the minimum requirement for the entrants coming into NPS is a 3.0 academy grade point average. These requirements are not sufficient. The standards must be raised to 3.3 academy grade point average to raise the overall academic

achievements at the NPS and checked current the basic qualifications required to attend NPS.

### 3. First Selection

In the first selection, the Education should be on the basis of the standing of candidates in the list of the ECL tesing score and TOEFL Testing score. The purpose of English testing taking in advance is to classified poor NPS cadidates for English language. Eventhough some candidates get good scores for other tests, if they do not have good English performance they fail to get good NPS grade through analysis. Therefore, English is important factor in selecting the NPS candidate.

For effective first selection, the multiple cutoff and regression method is required. To the multiple cutoff method, the effective cutting score to increase the NPS performance should be a score of 85 or more on the ECL test, above 3.3 NA grade and a score of 80 or more on the TOEFL test.

The NA grade, ECL testing score, and TOEFL testing score are important for predicting the NPS performance. Therefore, the regression equation between them and NPS grade is as follows :

$$\hat{Y} = -.8 + .011X_1 + .319X_2 + .025X_3$$

where  $\hat{Y}$  = Performance in NPS (NPS grade),  $X_1$  = NA grade,  $X_2$  = ECL Testing Score,  $X_3$  = TOEFL Testing Score

If candidates receive high enough values of  $\hat{Y}$  as well as the other three variables, they will be selected.

If the candidates fall within a score of 85 or more on the ECL test, above 3.3 NA grade, and a score of 80 or more on the TOEFL test, and if (as a first selection step)

$$\hat{Y} = -.8 + .275(3.3) + .319(85) + .025(80) = 29.2,$$

they are the most desirable selectees and offer the highest potential to show high NPS performance.

If the number of candidates chosen by this method are under the required number, a different multiple cutoff strategy or multiple regression equation should be

applied to select the NPS candidates. Candidates who come up in the inappropriate categories of testing scores will be rejected.

#### 4. Second Selection

In the second selection, if a candidate passes the first selection, the Education Department should select on the basis of the results on the Major Qualification Test and the Korean History Test. Actually, Korean History Tests are not good predictors for evaluating NPS performance. Therefore, the Education Department gives more weight to the Major Qualification score than the Korean History Score in the second selection.

#### 5. Third Selection

##### *a. Selection Committee*

(1) *Past Performance Appraisal.* The current selection procedure takes into account the past performance only as a determinative standard. But, in considering officers for a specific privilege, the record of past performance can be used as an important differentiating factor for comparing candidates against one another. For example, the candidates should not have instances of judicial punishment during their military service.

(2) *Education Record.* As key officers for higher academic opportunities the following can be taken into account: OBC (Officer's Basic Course in Korea) score, OAC (Officer's Advanced Course in Korea) score, and the academic performance at the other military schools.

(3) *Interview.* The purpose of the selection interview is to complement other selection and placement techniques and to assess qualities not objectively measured by other means, in order to determine the suitability of an applicant for a specific opening in an organization. The interview should also give sufficient information to the applicant about the job and the company so he may have a basis for accepting or rejecting employment if it is offered. A final purpose is to create a positive feeling toward the company and its management regardless of the outcome of the interview. Selection

interviews may help to assess personality and motivational traits, and if they correlate with criteria, can improve the selection batting average.

The difficulty of estimating personality and temperament in the interview should not be minimized. Interviewers should regard their own attempts at appraisal of personality and temperament traits through interviews with considerable reservation and caution. [Ref. 6: p. 4-148]

Through interview, background and performance ability should be emphasized so that the Education Department may do its best in identifying the personal characteristics of candidates .

The interviewer should check to the following areas:

1. Work history. (Duties, likes, achievements, dislikes, things done less well, working conditions, reasons for changing jobs, factors of job satisfaction, type of job desired, total job accomplishment.)
2. Education and training. (Best and poorest subjects, grades, how much effort, extracurricula activities, special achievement, training beyond the undergraduate level, total school achievement.)
3. Personality, motivation and character. (maturity, emotional stability, teamworker, tact, adaptability, tough-mindedness, self-discipline, initiative, follow-through, self-confidence, aggressiveness, conscientiousness, hard worker, honesty and sincerity.)

It could be a beneficial effort to the organization not only for the purpose of improving the selection for NPS education, but also the purpose of increasing the benefits to the organization after the formal education.

Also, the interview should be as directly related to actual job performance as possible. More ever, interview conducted by a board of interviewers apper to have higher reliability and validity than interviews conducted by a single interviewer.

The following entrance requirements are recommended: Major qualification testing should be 40 percent, Past performance record should be 20 percent, Personal interview record should be 20 percent, and Past education record should be 20 percent.

As outputs, the selecting committee selects two candidates. One will be the primary candidate and the other will be the alternate cadidate.

#### **6. Physical Examination**

The physical examination should be designed to disclose all of the physical characteristics of the individual that are significant from the standpoint of his efficient performance in the NPS. If candidate has serious problem, he should be skipped. Heart trouble, asthma or epilepsy are examples of recent health problems at NPS. These might have been better treated at home.

#### **7. English Language Training**

The individuals selected for the program are supposed to attend the military language training. But due to the operational requirements, many of the candidates do not get this opportunity. Education Department must make it a requirement for the candidates to attend the language training. A directive must be formulated where nobody can force any candidate from not getting this vital educational opportunity.

#### **8. Final Selection**

After the completion of the language training, all the selectees should take the formal ECL test given by the Education Department of the U.S 8th Corps in Korea.

With respect to final selection, the Education Department should resort to the additional achievement data (i.e., the formal ECL scores, and the acceptance by NPS). First, if the candidates are not accepted by NPS, they will not be considered candidates, If the candidates do not attain the required scores in the ECL test, they will also be skipped.

The Education Department forwards the names of two candidates to NPS with the confidence that the candidates will receive admission to NPS. If the primary candidate is unable to pass the formal ECL test or failed the physical examination, the alternate candidate is given the ECL test and the physical examination. If the selectees do not receive admission from NPS though they attain the minimum scores on the ECL test, they are skipped at the final selection.

## VI. RECOMMENDATIONS AND CONCLUSIONS

Education at NPS is very important to the future of the Korean Navy. English and education background are important predictors in evaluating good NPS performance. To be efficient the NPS selection, process should take note of poor English and NA grade performance. These candidates should be skipped prior to taking major qualification tests and the Korean history test. The purpose of English testing taking in advance is to classify poor NPS candidates for English language. Even though some candidates get good scores for other tests, if they do not have good English performance they fail to get good NPS grade through analysis. Therefore, English is important factor in selecting the NPS candidate.

For effective first selection, the multiple cutoff and regression method is required. To the multiple cutoff method, the effective cutting score to increase the NPS performance should be a score of 85 or more on the ECL test, above 3.3 NA grade and a score of 80 or more on the TOEFL test. If the candidates fall within a score of 85 or more on the ECL test, above 3.3 NA grade, and a score of 80 or more on the TOEFL test, and if (as a first selection step)

$$\hat{Y} = -.8 + .275(3.3) + .319(85) + .025(80) = 29.2,$$

they are the most desirable selectees and offer the highest potential to show high NPS performance.

If the number of candidates chosen by this method are under the required number, a different multiple cutoff strategy or multiple regression equation should be applied to select the NPS candidates. Candidates in the inappropriate categories of testing scores will be skipped.

To increase overall effectiveness in selecting NPS candidates, the following recommendations are proposed:

First of all, many Naval officers must be given an opportunity to further their education. The senior naval officers must also realize that education is vital to the Navy's future. Operational Commitments are important, but the senior officers should not be close-minded. Instead, they must be open-minded and flexible. They must help to find the

opportunity for the young officers to develop their minds and help the Navy. Instead of discouraging the young minds, the senior officers must encourage them.

Second, the NPS graduatee who return to Korea and to their commands are frequently penalized by the senior officers. If the returning graduates are rewarded with accelerated promotion and improved performance marks, more officers will try to get into the program. As a result, the overall standards of the NPS graduates will improve and more highly-educated personnel will emerge. The Korean Navy will definitely benefit from this and the future will be bright.

Third, the line officers are currently neglected in the selection process of attending NPS. This should not happen because the line officer community is the largest in the Navy and the rest of the branches exist to support the line officers. The line officers must get priority over the rest of the branches.

Fourth, compared to the other branches of the military, the Navy candidates to the NPS do not receive sufficient English language training. The Navy requires a six-week language training while the Army requires 6 months and the Air Force requires 3 month. This must change and the Navy must expand its language-training period. This will result in a better-prepared officers coming to the NPS. Also, Navy candidates to NPS sometimes could be incorporated with the Army personnel program until a Navy language training can be fully incorporated.

## APPENDIX A. SPSSX PROGRAM

FILE HANDLE TEST / NAME = 'TEST SPSSX A1'

DATA LIST

```

/1 NPSG 1-4
   ECL  6-7
   NAG  9-12
   TOEFL 14-15
   BRANCH 17
   CURR  19
   YEAR  21
  
```

VARIABLE LABELS

```

NPSG 'NPS GRADE'
ECL  'ECL SCORE'
NAG  'NAVAL ACADEMY GRADE'
TOEFL 'TEST OF ENGLISH AS A FOREIGN LANGUAGE'
BRANCH 'BRANCH OF SERVICE'
CURR  'CURRICULUM'
  
```

VALUE LABELS

```

BRANCH 1 'ENGINEERING'
        2 'INTELLIGENCE'
        3 'COMMUNICATION'
        4 'SURFACE-WARFARE'
        5 'COMPUTER'
        6 'EDUCATION'
        7 'WEAPON'
        8 'AVIATION' /
CURR    1 'ADMINISTRATIVE SCIENCE'
        2 'COMPUTER SCIENCE'
        3 'OPERATIONS RESEARCH'
        4 'INFORMATION SCIENCE'
        5 'WEAPON SCIENCE'
        6 'ELECTRICAL ENGINEERING'
        7 'OCEANOGRAPHIC'
        8 'MECHANICAL ENGINEERING'
        9 'ENGINEERING ACOUSTICS' /
YEAR    1 '83'
        2 '84'
        3 '85'
        4 '86'
        5 '87'
  
```

```

RECODE NPSG(2.75 THRU 3.14=1) (3.15 THRU 3.29=2)
        (3.30 THRU 3.44=3) (3.45 THRU 3.85=4)
  INTO GRADNPS
  
```

```

RECODE NAG(2.75 THRU 3.14=1) (3.15 THRU 3.29=2)
        (3.30 THRU 3.44=3) (3.45 THRU 3.85=4)
  INTO GRADNA
  
```

```

RECODE ECL(80 THRU 81=1) (82 THRU 84=2) (85 THRU 88=3) (89 THRU 92=4)
  INTO SECL
  
```

```

RECODE TOEFL(70 THRU 74=1) (75 THRU 79=2) (80 THRU 84=3) (85 THRU 90=4)
  INTO STOEFL
  
```

BEGIN DATA

```

3.03 84 2.95 74 7 5 5
  
```

3.25 82 3.03 82 6 6 5  
 3.68 88 3.75 90 3 6 5  
 3.75 89 3.52 86 3 6 5  
 3.08 84 3.13 80 7 5 5  
 3.35 82 3.11 78 1 3 5  
 3.85 92 3.42 88 6 3 4  
 2.98 82 2.97 74 4 1 4  
 3.05 80 2.79 82 7 6 4  
 3.23 87 3.13 82 5 2 4  
 3.32 89 3.23 78 5 3 4  
 3.13 82 3.18 76 7 5 3  
 3.22 83 3.03 82 3 6 3  
 3.35 87 3.38 84 6 6 3  
 3.38 90 3.68 84 3 6 3  
 3.18 80 3.23 74 5 3 3  
 3.05 81 3.43 82 1 8 3  
 3.07 84 3.23 84 1 8 3  
 3.68 89 3.83 90 3 6 2  
 3.15 83 3.28 80 7 5 2  
 3.09 80 3.08 72 7 5 2  
 3.02 82 2.89 76 4 1 2  
 3.18 85 2.95 80 1 1 2  
 3.23 86 3.12 76 3 2 2  
 3.13 83 3.16 82 6 9 2  
 3.13 84 3.04 84 1 4 2  
 3.08 84 3.17 78 4 9 1  
 3.03 82 3.15 82 1 1 1  
 2.98 83 3.23 72 1 6 1  
 3.23 88 3.08 80 3 6 1  
 3.15 87 2.89 84 3 6 1  
 3.12 85 3.05 80 8 7 1  
 3.05 82 3.18 76 2 7 1  
 3.15 85 3.13 72 6 3 1  
 3.28 87 3.23 82 4 3 1  
 3.35 92 3.46 88 6 8 1

END DATA

CONDESCRIPTIVE ECL/NAG/NPSG/TOEFL

CROSSTABS TABLES=BRANCH BY CURR/CURR BY YEAR/BRANCH BY YEAR/

GRADNA BY GRADNPS/SECL BY GRADNPS/STOEFL BY GRADNPS/

OPTION 3 4

STATISTICS 1

REGRESSION DESCRIPTIVES/ VARIABLES=NPSG NAG ECL TOEFL/  
 DEPENDENT=NPSG/ENTER/STEPWISE/  
 RESIDUALS=DEFAULT/  
 SCATTERPLOT (\*RES,\*PRED)/  
 CASEWISE=DEFAULT ALL/

SAVE=SEPPRED (SE)/

PLOT CUTPOINTS=EVERY (36) /

PLOT=NPSG WITH ECL/  
 PLOT=NPSG WITH NAG/  
 PLOT=NPSG WITH TOEFL/

FINISH

## APPENDIX B. PROGRAM RESULT

### A. OUTCOME OF NA GRADE

		NPS Grade					
		COUNT				ROW	
		PCT				TOTAL	
		2.75 -	3.15 -	3.30 -	3.45 -		
		3.14	3.29	3.44	3.85		
NA Grade	2.75 -	8	8	1		17	
	3.14	47.1	47.1	5.9		47.2	
		50.0	72.7	20.0			
	3.15 -	7	3	1		11	
	3.29	65.6	27.5	9.1		30.6	
		45.8	27.3	20.0			
	3.30 -	1		1	1	3	
	3.44	33.3		33.3	33.3	8.3	
		6.3		20.0	25.0		
	3.45 -			2	5	5	
	3.85			40.0	60.0	13.9	
				40.0	75.0		
		COLUMN	16	11	5	4	36
		TOTAL	44.4	30.6	13.9	11.1	100.0

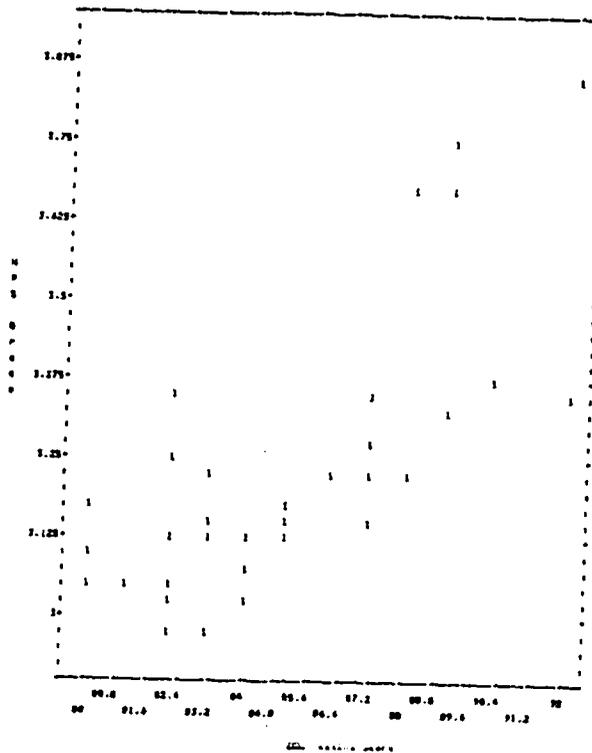
### B. OUTCOME OF ECL TESTING SCORE

		NPS Grade					
		COUNT				ROW	
		PCT				TOTAL	
		2.75 -	3.15 -	3.30 -	3.45 -		
		3.14	3.29	3.44	3.85		
ECL Score	80 - 81	3	1			4	
		75.0	25.0			11.1	
		18.8	9.1				
	82 - 84	12	3	1		16	
		75.0	18.8	6.3		44.4	
		75.0	27.3	20.0			
	85 - 88	1	7	1	1	10	
		10.0	70.0	10.0	10.0	27.8	
		6.3	63.6	20.0	25.0		
	89 - 92			3	3	6	
				50.0	50.0	16.7	
				60.0	75.0		
		COLUMN	16	11	5	4	36
		TOTAL	44.4	30.6	13.9	11.1	100.0

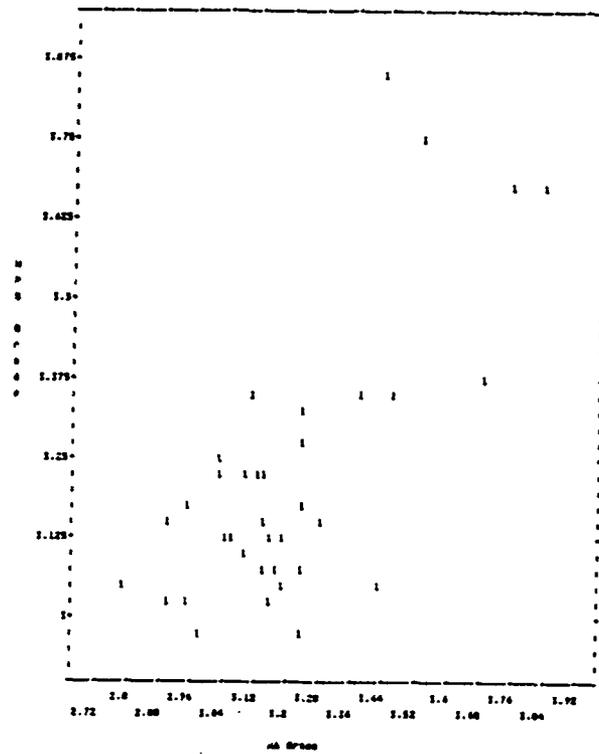
### C. OUTCOME OF TOEFL TESTING SCORE

TOEFL Score	NPS Grade				TOTAL
	2.75 - 3.14	3.15 - 3.29	3.30 - 3.44	3.45 - 3.85	
70 - 74	4 66.7 25.0	2 33.3 18.2	1 16.7 4.0	1 16.7 4.0	6 16.7
75 - 79	4 57.1 25.0	1 14.3 9.1	2 28.6 40.0	1 16.7 4.0	7 19.4
80 - 84	8 44.4 50.0	8 44.4 72.7	2 11.1 40.0	1 16.7 4.0	18 50.0
85 - 90	1 16.7 4.0	1 16.7 4.0	1 16.7 4.0	4 66.7 100.0	5 13.9
COLUMN TOTAL	16 44.4	11 30.6	5 13.9	4 11.1	36 100.0

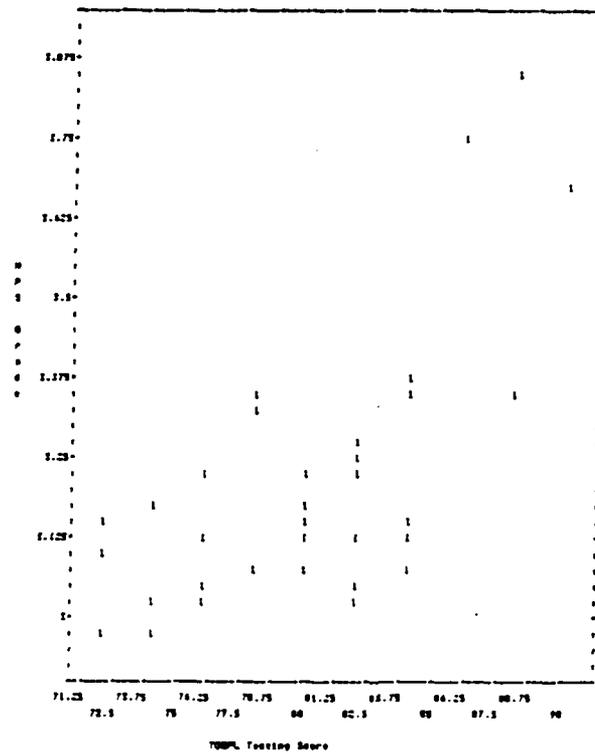
### D. PLOT OF NPS GRADE WITH ECL TESTING SCORE



E. PLOT OF NPS GRADE WITH NA GRADE



F. PLOT OF NPS GRADE WITH TOEFL TESTING SCORE



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