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A COMPARISON OF NEEDS AND INTRINSIC MOTIVATION
OF COLLEGE SENIORS AND EMPLOYED ENGINEERS WITH
FROM 0 - 9 YEARS OF CAREER SENIORITY

BY

JAMES A. RERICH
B.S., NORTH DAKOTA STATE UNIVERSITY, 1975

THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Science in Psychology
in the Graduate Studies Program of
Florida Technological University

Orlando, Florida
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TABLE OF CONTENTS

	Page
List of Tables	v
Introduction	1
Method	5
Results	10
Discussion	18
Appendix A	21
Appendix B	26
Appendix C	30
Bibliography	34

LIST OF TABLES

Table	Page
1. Frequency Distribution	8
2. ANOVA: Importance of Social Need	11
3. ANOVA: Importance of Self-Actualization Need . .	11
4. ANOVA: Intrinsic Motivation	13
5. ANOVA: Security Need Satisfaction	13
6. ANOVA: Overall Job Satisfaction	14
7. ANOVA: Amount of Security	14
8. ANOVA: Importance of Security Need	30
9. ANOVA: Social Need Satisfaction	30
10. ANOVA: Importance of Esteem Need	31
11. ANOVA: Esteem Need Satisfaction	31
12. ANOVA: Importance of Autonomy Need	32
13. ANOVA: Autonomy Need Satisfaction	32
14. ANOVA: Self-Actualization Need Satisfaction . . .	33
15. ANOVA: Security Aspiration	33

A COMPARISON OF NEEDS AND INTRINSIC MOTIVATION OF COLLEGE SENIORS AND EMPLOYED ENGINEERS WITH FROM 0 - 9 YEARS OF CAREER SENIORITY

This Master's thesis compared the importance of needs, based on a Maslow-type heirarchy, of senior engineering students with non-supervisory employed engineers. Furthermore, comparisons were made of need satisfaction, intrinsic motivation, and a measure of overall job satisfaction, with years of career employment, at one level of non-supervisory employed engineers.

Argyris (1957) argues that the requirement of formal organizations act to block, to a degree, the growth needs of individuals. The individual, as a result, rather than place greater value on higher order needs such as self-actualization during the later career stages, comes to place greater value on lower order needs such as security and material rewards.

In contrast to Argyris, Maslow (cited in Hall and Nougaim, 1968) in a revision of his need heirarchy proposed changes in the importance of different needs at different ages. He states that the ego needs (esteem and autonomy) were the most important during the early career years and the higher order need of self-actualization becomes more important near the end of the career years.

The empirical evidence has been somewhat contradictory, although most of the evidence would seem to support the theory of Argyris rather than the theory of Maslow.

Porter's (1961) study of nearly 2,000 managers at all organizational levels, showed that the importance of needs for security and social satisfaction increased with age, while the importance

of the need for self-actualization decreased.

The study of Hall and Mansfield (1975) provided further support for Argyris' theory, with the need for security increasing with age while self-actualization decreased in importance with age.

Inconclusive results were found in the study of Hall, Schneider, and Nygren (1970) working with the United States Forest Service. Although the importance of security needs did increase with age no decrease was found in the importance of self-actualization needs.

The above mentioned studies all relate to changes in need importance over the entire career of the individuals. It is the intent of the present study to compare need importance over the relatively short term of from 0 - 9 years of total career employment to find if security needs relatively quickly increase in importance and self-actualization needs decrease in importance. Since the above studies measure need importance over the entire career years, and are also restricted to non-supervisory individuals, the possibility arises that the changes in need importance found, are due to the fact that persons with the highest importance attached to self-actualization needs are being systematically promoted into supervisory/managerial positions. It is also the contention of the present study, to show that career seniority and not age nor job seniority is the most constant factor affecting changes in need levels.

Therefore, the hypotheses of this thesis are that:

- 1) the importance of security needs increase with career seniority
- 2) the importance of self-actualization needs decreases with the increase of career seniority
- 3) the level of intrinsic motivation increases with career seniority
- 4) a significant difference exists between the need importance and intrinsic motivation levels of college seniors, compared to

employed engineers.

Given that the above hypotheses are supported, it may be the fact that organizations are, as Argyris has charged, blocking the higher order growth needs of individuals, therefore forcing the individual to emphasize the lower order needs and material rewards.

Schein (1964) argues that the expectations and needs of newly hired college graduates are sufficiently out of line with the expectations and needs of organizations as to be detriments to both participants. The organizations accuse newly hired college graduates of being, in general, overambitious and unrealistic in their expectations. Schein does not argue who, if anyone, is right but instead employs the organization with the responsibility to take the initiative to prevent a self-defeating pattern from emerging. If organizations recognize the great potential of the college graduate and create circumstances for him that utilize rather than defeat the very qualities which make him valuable, i.e. his education and his youthful enthusiasm and idealism, they will be serving the betterment of both the individual and the organization. (p.76)

Berlew and Hall (1966) completed a study which showed that the first year of working for an organization is a critical period of learning, and a period in which the trainee is uniquely ready to develop or change in the direction of the company's expectations. The results of their study showed that managers' whose initial jobs were more demanding, performed better over a four or five year period than those whose initial jobs were less demanding. Berlew and Hall speculate that meeting high company expectations in the critical first years lead to the internalization of positive job attitudes and high standards. On the other hand, either being assigned to an undemanding job or failing to meet the challenge of a demanding job in the first year, may seriously jeopardize the new managers' subsequent performance and success.

"Either failure to meet high expectations, or being given a job which demands little of the manager may lead to a failure of the manager to develop positive job attitudes, meaning that he will respond primarily to external work incentives, and his lack of high personal standards of performance will lead him to do only as much as is expected of him." (p. 221-222)

A study done by Rosenberg (1957) measured college student's values before, and two years after taking his first job. Results of his study showed that a person's choice of job is determined by their values. Inconsistency in a person's values and a person's job tend to produce changes in both, in the direction of greater mutual consistency, thereby reducing conflict. Rosenberg noted that typically a person was more likely to change his job to coincide with his values than vice versa.

Early research in the literature dealing with higher order need satisfaction attitudes and intrinsic motivation attitudes, left unanswered their commonality or distinctiveness. Results of factor analysis by Lawler and Hall (1970) indicated that higher order need satisfaction attitudes and intrinsic motivation attitudes are separate and distinct attitudes toward a job. Intrinsic motivation was found to be most strongly related to individual effort and performance, whereas higher order need satisfaction attitudes were most strongly related to the degree to which the job actually provides the autonomy and growth experiences the individual feels it should.

The empirical evidence reported by Hall and Mansfield (1975) showed that intrinsic motivation was positively and significantly related to age. Furthermore, their results showed that intrinsic motivation increased steadily with age, while at the same time the importance of security was increasing and the importance of self-actualization was decreasing.

METHOD

Subjects

Data were gathered from 18 undergraduate students at Florida Technological University. This group of subjects were all in their senior year in an engineering program.

Of the 125 questionnaires sent to the employed engineers, 51 were returned. These engineers were working in non-supervisory positions as members of engineering teams for a large defense contractor.

Questionnaire

The data were obtained by administration of a modified version of the questionnaire used by Porter (1961, 1962, 1963) in his studies of need satisfaction. One additional item was added to the thirteen items originally used by Porter. This item, recommended by Costello and Lee (1974) dealt with the feeling of being informed inside the organization, and was found in their study to have the highest need deficiency (lowest need satisfaction) score and the third highest need importance score. Based on these results, the above mentioned item was included in the present study in the esteem needs category.

The fourteen items were presented in random order on the questionnaire so as to ensure, as much as possible, that the respondents do not establish differing response sets for the five different categories.

For each of the fourteen items in part one of the questionnaire, the respondents were asked to give two or three ratings, depending on whether the respondent was a student or an employed engineer.

The ratings were:

- a) How much of the characteristic is there now connected with your engineering position?
- b) How much of the characteristic do you think should be connected with your engineering position?
- c) How important is this position characteristic to you?

The above ratings are a measure of Need Amount, Need Aspiration, and Need Importance, respectively.

The student respondents were asked to answer parts (b) and (c) for each of the fourteen items. The employed engineers were asked to answer parts (a), (b), and (c) for each of the fourteen items. (Appendix A and B are the actual questionnaires which were used for the two groups of respondents.)

Respondents were asked to answer the above items by circling a number on a rating scale 1 to 7, where the smallest number represents the minimum amounts, and the largest number represents the maximum amounts.

The information obtained from part one of the questionnaire, for the engineering students, was restricted to Need Aspiration and Need Importance for each of the fourteen items. For the employed engineers, part one of the questionnaire yielded a measure of Need Amount, Need Aspiration, and Need Importance. Furthermore, also obtained was a measure of Need Satisfaction, obtained by subtracting Need Amount from Need Aspiration, for each of the fourteen items. In addition, a derived measure, referred to as Overall Job Satisfaction (OJS) by Costello and Lee (1974) was also obtained from the employed engineers.

The OJS is assumed to be the aggregate of weighed Need Satisfaction, and is derived by calculating:
$$\left(\frac{\sum (\text{Need Amount} \times \text{Need Importance})}{\sum (\text{Need Aspiration} \times \text{Need Importance})} \right) \times 100.$$

"The OJS for each respondent represents the overall level of needs satisfaction with appropriately perceived importance of each need item incorporated in the measure."(p.457)

Costello and Lee argue that this measure of Overall Job Satisfaction is a better unbiased measure of job satisfaction than a score obtained from a single question which asks the respondent to gauge his level of job satisfaction.

Evidence on the reliability and validity of Porter's questionnaire and the other instrument is reported in Hall and Mansfield (1971).

Part two of this questionnaire consisted of four questions which measure the level of intrinsic motivation of the respondent. These four items were identical to those used by Lawler and Hall (1970). The employed engineers and the engineering students replied to the four items on a seven point Likert-type scale; (1=strongly disagree, 7=strongly agree). For the engineering students, the directions for these four questions clarified to the students that their responses were to be based in relation to their course work.

At the end of the questionnaire were a number of biographical questions, asking the age of the respondent and for the employed engineers, the length of time employed in their present job, as well as the total length of time that they have been employed as professional engineers.

Procedures

Data was gathered and categorized into four groups of subjects; senior engineering students, employed engineers with from 0 - 3 years of career seniority, employed engineers with from 3 - 6 years of career seniority, and employed engineers with from 6 - 9 years of career seniority. The frequency distribution of the respondents is presented in Table 1.

Table 1

Distribution of Engineers by Career Seniority

Seniority grouping	f	%
Four seniority groups by Years		
0 (students)	18	26.1
0 - 3	16	23.2
3 - 6	18	26.1
6 - 9	17	24.6

Statistical Analysis

A number of one-way Analyses of Variance were performed on the collected data. The factor used for these analyses was Career Seniority at the levels of: senior engineering students (designated 0 years of career seniority), employed engineers with from 0 - 3 years of career seniority, employed engineers with from 3 - 6 years of career seniority, and employed engineers with from 6 - 9 years of career seniority.

The Analysis of Variance procedure was employed so as to look for the existence of linear and quadratic trends. This procedure is explained in Hays, (1963) pages 555-558. Because of the existence of unequal sample size in the four groups of respondents, it was necessary to apply a correction to the ΣX and ΣX^2 of each group. This correction was carried out only after the procedure outlined in Ferguson, (1971) pages 238-239, showed a non-significant χ^2 . The calculation of a non-significant χ^2 tells that the observed frequencies are within the limits of the expected frequencies and therefore the alpha level will not be affected when the correction is applied.

RESULTS

Prior to beginning the Analysis of Variance, it was deemed necessary to perform a Pearson product moment correlation coefficient between the Career Seniority and the Age of the employed engineers. This was done to ensure that a correlation of such magnitude did not exist so as to make a distinction between these two variables irrelevant. The results showed an $R=.546$, this result, although significant, as was to be expected, tells that age only accounts for 29.8% of the variance in career seniority. It therefore seems reasonable that these variables be treated as distinct and different variables.

In order to test the hypotheses as outlined earlier in this thesis, it was necessary to perform a number of one-way Analysis of Variance operations. Results from these analyses, as well as the Means for each group, are presented in Tables 2 through 13. The tables for the Analyses of Variance which did not yield significant F's are located in Appendix C.

As can be seen from these tables, 4 groups of S's were tested on Intrinsic Motivation and for each of the five Need Importance areas. Also, 3 groups of S's were tested on Overall Job Satisfaction as well as on the five Need Satisfaction areas. This difference in the number of groups was caused by the inability to obtain Need Satisfaction scores and a measure of Overall Job Satisfaction from the engineering students.

The results show a significant decreasing linear trend for the Importance of Social Needs, ($F=4.41$, $p<.05$, $df=1,65$) Table 2, for the Importance of Self-Actualization Needs, ($F=5.33$, $p<.05$, $df=1,65$)

Table 2
ANALYSIS OF VARIANCE:
Importance of Social Need

Source of Variance	SS	df	MS	F
Between	6.48	3	2.16	1.86
Linear	5.13	1	5.13	4.41 *
Quadratic	1.15	1	1.15	.99
Other Trends	.20	1	.20	.17
Within	75.59	65	1.16	
Total	82.06	68		

*p < .05	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	5.39	5.5	5.11	4.71

Table 3
ANALYSIS OF VARIANCE:
Importance of Self-Actualization Need

Source of Variance	SS	df	MS	F
Between	3.36	3	1.12	1.92
Linear	3.11	1	3.11	5.33 *
Quadratic	.09	1	.09	.15
Other Trends	.17	1	.17	.28
Within	37.86	65	.58	
Total	41.22	68		

*p < .05	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	6.43	6.40	6.07	5.90

Table 3, and for Intrinsic Motivation, ($F=5.09$, $p<.05$, $df=1,65$) Table 4. Furthermore, there are also two significant quadratic trends. Security Need Satisfaction, which is a deficiency score showed a higher deficiency at the earliest years of career seniority (0 - 3), and at the latest years of career seniority tested (6 - 9), than at the middle years, ($F=6.75$, $p<.05$, $df=1,48$) Table 5. The other significant quadratic trend is for the Overall Job Satisfaction measure. The results from this analysis are in the opposite direction from the results obtained from the Security Need Satisfaction analysis. That is, there was a significant higher percentage of OJS found at the middle seniority years than at either the early or the late career seniority years, ($F=4.44$, $p<.05$, $df=1,48$) Table 6.

Although a significant difference was obtained in the Security Need Satisfaction analysis, since this is a deficiency score, it is not clear whether this is due to a change in the Security Need Aspiration or to a change in the present amount of Security. For this reason two further Analyses of Variance were performed, one on Security Need Aspiration and one on the present levels of Security. The Security Aspiration, Analysis of Variance (Table 15), resulted in no significant differences between levels of career seniority and no significant trends. The Analysis of Variance performed on the present amount of Security, across career seniority, resulted in a significant main effect, ($F=5.10$, $p<.05$, $df=2,48$) Table 7, as well as significance in the form of a quadratic trend, ($F=7.24$, $p<.05$, $df=1,48$) Table 7. Post hoc analyses were performed on the significant main effect using the Tukey procedure. The results from these analyses showed a significant difference between the mean of group 2 (3-6 years) and the mean of group 3 (6-9 years), ($Q=4.51$, $p<.05$, $df=3,48$).

For ease of interpretation, all significant results are graphed

Table 4
ANALYSIS OF VARIANCE:
Intrinsic Motivation

Source of Variance	SS	df	MS	F
Between	3.00	3	1.00	1.95
Linear	2.61	1	2.61	5.09 *
Quadratic	.09	1	.09	.18
Other Trends	.29	1	.29	.57
Within	33.34	65	.51	
Total	36.33	68		

*p<.05	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	6.39	6.41	6.06	5.93

Table 5
ANALYSIS OF VARIANCE:
Security Need Satisfaction

Source of Variance	SS	df	MS	F
Between	16.57	2	8.28	
Linear	.26	1	.26	.11
Quadratic	16.29	1	16.29	6.75 *
Within	115.82	48	2.41	
Total	132.38	50		

*p<.05	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	2.0	.89	2.18

Table 6
ANALYSIS OF VARIANCE
Overall Job Satisfaction

Source of Variance	SS	df	MS	F
Between	1235.49	2		
Linear	300.22	1	300.22	1.43
Quadratic	934.03	1	934.03	4.44 *
Within	10099.95	48	210.42	
Total	11335.44	50		

*p<.05	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	73.88	79.98	67.92

Table 7
ANALYSIS OF VARIANCE
Amount of Security

Source of Variance	SS	df	MS	F
Between	20.18	2	10.09	5.10 *
Linear	5.85	1	5.85	2.83
Quadratic	14.30	1	14.30	7.24*
Within	94.87	48	1.98	
Total	115.05	50		

*p<.05	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	4.13	4.83	3.29

in Figures 1 and 2.

One of the hypotheses for this paper was that a significant difference exists between the levels of the factor career seniority, in the Need Importance and Intrinsic Motivation analysis. The main F's were compared for the five Need Importance areas and for Intrinsic Motivation. As can be seen from these tables, no significant differences were found.

Figure 1

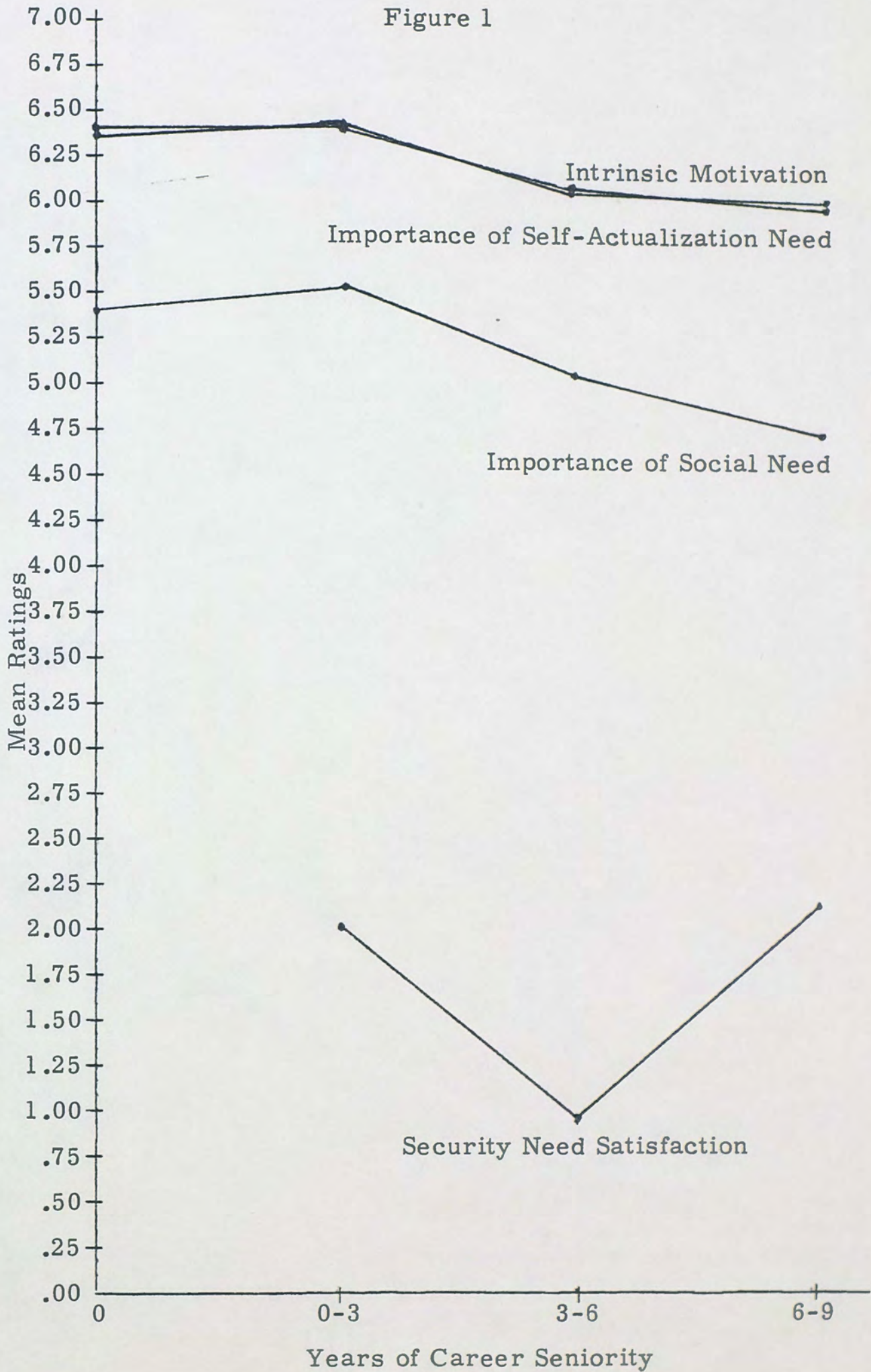
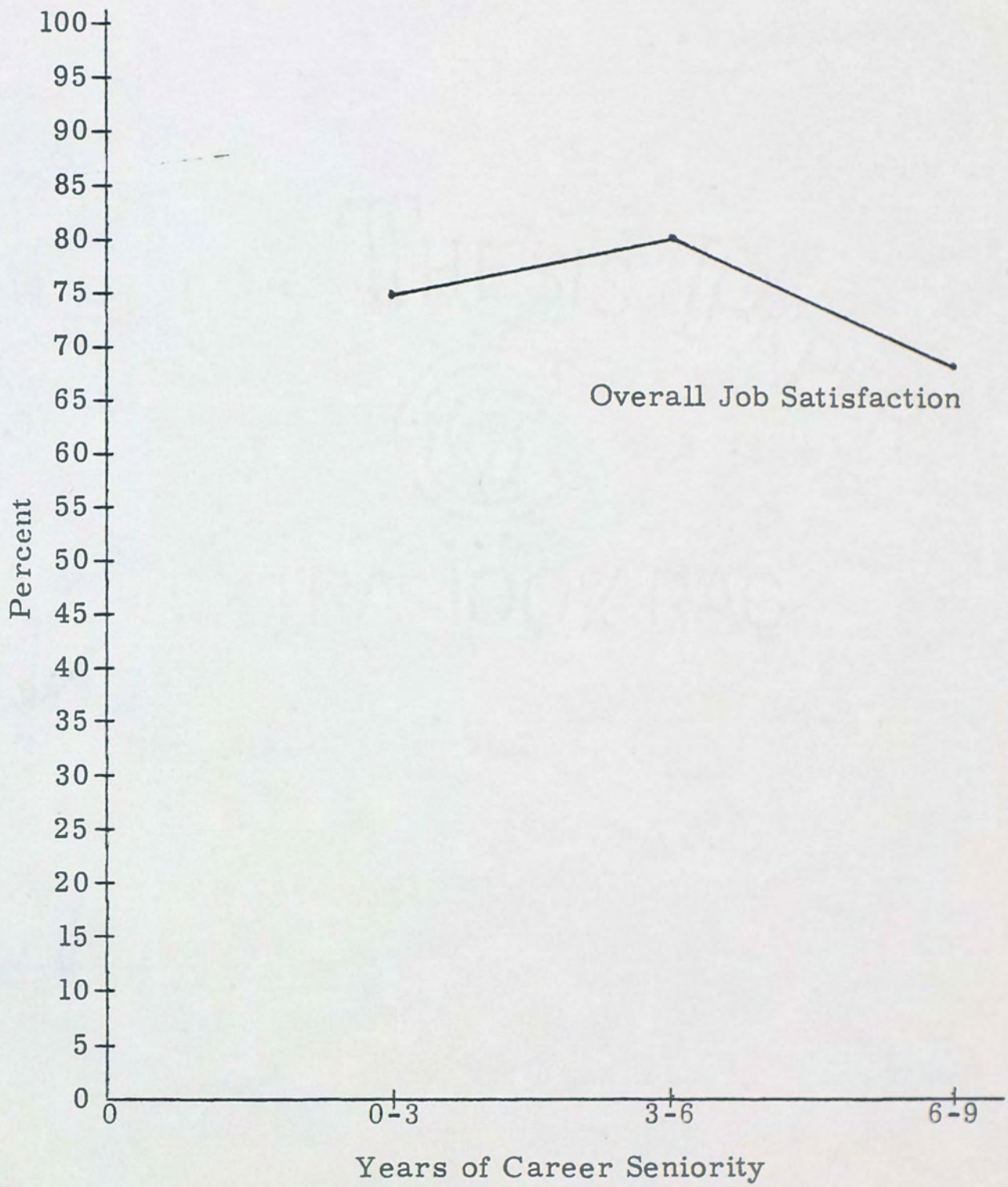


Figure 2



DISCUSSION

The significant results found in this study do seem to be more supportive of the theoretical concepts advanced by Argyris rather than those of Maslow. Even with the restriction in the range of seniority to a maximum of 9 years, the Importance of Self-Actualization Needs do show a significant decrease. Also, according to the theory of Argyris, in the later career years, people come to place a greater value on material rewards. With this increase in Extrinsic Motivation it would seem logical to assume a corresponding decrease in Intrinsic Motivation. This decrease, in the form of a linear trend, was found in the present study. These results are particularly interesting because of the significant decrease over the relatively short span of years. As this finding is in contradiction to the findings of Hall and Mansfield (1975), it is unclear at the present time if a decrease in Intrinsic Motivation with increasing career seniority is representative of all large organizations, only to national defense contractors, or only to the company in the present study.

The above findings of a decrease in the Importance of Self-Actualization Needs with an increase in seniority are similar to the findings of Porter (1961), and in support of the theories of Argyris. In contradiction to both the findings of Porter and the theory of Argyris was the finding that the Importance of Social Need decreased with the increase in seniority. This finding may be unique to the group of people questioned, i.e. engineers, or again this finding may be representative only of this organization. For whatever reason, this result supports Maslow's idea of the

lowed order needs being satisfied and therefore becoming less important to the individual as the length of his seniority increases.

It was seen in the previous section that two significant quadratic results were obtained. Specifically, these were the Overall Job Satisfaction measure and the Security Need Satisfaction measure. These quadratic results are more difficult to interpret than the linear trends. However, these results are supportive of each other, thereby decreasing the likelihood that either are spurious. They are supportive in that the Security Need Satisfaction scores, which are deficiency scores, are at their highest level (3 - 6 years), when the Overall Job Satisfaction measure, expressed as a percentage, is at its lowest level.

Comparing the main effects of the levels of the factor Career Seniority, on the Need Importance areas and Intrinsic Motivation, no significant differences were found. This non-significance of main effects while at the same time obtaining significant trends appears contradictory. One explanation for this may be, that restricting the career seniority to a nine year period does not allow sufficient differences to develop between the means of the levels, while at the same time there is a sufficient period for significant trends to develop. If this is the case, significant differences between the means of the levels of career seniority would develop with the addition of a greater length of career seniority.

Earlier in this paper it was noted that factor analytical results by Hall and Mansfield (1975) had established that higher order need satisfaction attitudes and intrinsic motivation attitudes are separate and distinct attitudes toward a job. Due to the similarity shown in Figure 1 of this paper between the Importance of Self-Actualization Need attitudes and Intrinsic Motivation attitudes, a Pearson product moment correlation was performed using these

variables. Results of this correlation produced an $R=.468$ ($T=4.33$, $p .001$, $df=67$). It is now possible to conclude that although the higher order need satisfaction attitudes are independent of intrinsic motivation attitudes, found in the factor analytical work of Hall and Mansfield (1975), the importance of the higher order need attitudes are strongly related to the intrinsic motivation attitudes.

Up to this time only Career Seniority has been mentioned, and its relationship to the various needs. It is worthy to note that many of the other studies in this area use Age and not Seniority in their analysis. Due to the relatively small sample size, it was not considered feasible to perform any further Analysis of Variance. This is unfortunate, as performing these Analyses of Variance again, using age groupings, would have allowed the comparison of results in order to answer the question as to whether age or career seniority is the most consistent measure affecting changes in Needs. Assuming further analyses could have been performed, the failure of the factor Age to produce the significant trends that were produced by the factor Career Seniority, would have been evidence that seniority is the most constant measure affecting changes in Needs.

APPENDIX A

The authorization to give this questionnaire has been granted by the personnel department of _____ Corporation.

The purpose of this questionnaire is to ascertain levels of needs and importance of these needs for different groups of employed engineers and for engineering students.

This questionnaire is part of the Master's thesis for James Rerich, a graduate student in Industrial Psychology at Florida Technological University.

You are requested not to put your name or any other information which may be used for identification of specific individuals on this questionnaire.

In no case will persons connected with _____ be given raw individual scores. _____ will be furnished with total group scores in order to pinpoint specific strengths and weaknesses in the personnel policy as it now exists.

Your coopération in this task is greatly appreciated. Upon completion of my Master's thesis I will be glad to furnish group data results and significant conclusions which have been drawn from the data to any individuals who may so desire.

Respectfully yours,

James A Rerich

APPENDIX A (Con't.)

INSTRUCTIONS

Part 1 of this questionnaire lists several characteristics or qualities connected with engineering positions. For each such characteristic you will be asked to give three ratings:

- a. How much of the characteristic is there now connected with your engineering position?
- b. How much of the characteristic do you think should be connected with your engineering position?
- c. How important is this position characteristic to you?

For each of the 14 items, answer the above three questions by circling a number on a rating scale 1 to 7, where the lowest number represents the minimum amounts, and the highest number represents the maximum amounts.

1. The opportunity, in my engineering position, for participation in the determination of methods and procedures:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
2. The opportunity, in my engineering position, for participation in the setting of department goals:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
3. The feeling of job security in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
4. The feeling of self-esteem a person gets from being in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

APPENDIX A (Con't)

5. The prestige of my engineering position outside the company (that is, the regard received from others not in the company):
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
6. The authority connected with my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
7. The prestige of my engineering position inside the company (that is, the regard received from others in the company):
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
8. The feeling of worthwhile accomplishment in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
9. The opportunity for personal growth and development in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
10. The opportunity for independent thought and action in my engineering position (that is, the opportunity to do things a different way):
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

APPENDIX A (Con't)

11. The opportunity to develop close friendships in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
12. The feeling of self-fulfillment a person gets from being in my engineering position (that is, the feeling of being able to use one's own unique capabilities, realizing one's potentialities):
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
13. The opportunity, in my engineering position, to give help to other people:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
14. The feeling of being kept informed, inside the organization, that a person gets from being in my engineering position:
 - a) How much is there now? (min) 1 2 3 4 5 6 7 (max)
 - b) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - c) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

INSTRUCTIONS

Part 2 of this questionnaire consists of a number of statements, you are to respond to these statements using a scale from 1 to 7 with 1=strongly disagree and 7=strongly agree.

15. When I do my work well, it gives me a feeling of accomplishment.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

16. When I perform my job well, it contributes to my personal growth and development.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

APPENDIX A (Con't)

17. I feel a great sense of personal satisfaction when I do my job well.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

18. Doing my job well increases my feeling of self-esteem.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

19. In the space below, write the number of years that you have been employed, as an engineer, by _____.

20. In the space below, write the total number of years that you have been employed as an engineer.

21. Write your age in the space below.

22. Indicate whether or not you have been awarded a four year college/university diploma.

☐

Yes

☐

No

APPENDIX B

This questionnaire is being given to engineering students who are in their senior year and also to different groups of employed engineers.

The purpose of this questionnaire is to ascertain levels of needs and importance of these needs for different groups of employed engineers and for engineering students.

This questionnaire is part of the Master's thesis for James Rerich, a graduate student in Industrial Psychology at Florida Technological University.

You are requested not to put your name or any other information which may be used for identification of specific individuals on this questionnaire.

Your cooperation in this task is greatly appreciated. Upon completion of my Master's thesis, I will be glad to furnish group data results and significant conclusions which have been drawn from the data to any individuals who may so desire.

Respectfully yours,

James A Rerich

APPENDIX B (Con't.)

INSTRUCTIONS

Part 1 of this questionnaire lists several characteristics of qualities connected with engineering positions. For each such characteristic you will be asked to give two ratings:

- a. How much of the characteristic do you think should be connected with your engineering position?
- b. How important is this position characteristic to you?

For each of the 14 items, answer the above two questions by circling a number on a rating scale 1 to 7, where the lowest number represents the minimum amounts, and the highest number represents the maximum amounts.

1. The opportunity, in my engineering position, for participation in the determination of methods and procedures:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
2. The opportunity, in my engineering position, for participation in the setting of department goals:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
3. The feeling of job security in my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
4. The feeling of self-esteem a person gets from being in my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
5. The prestige of my engineering position outside the company (that is, the regard received from others not in the company):
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
6. The authority connected with my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

APPENDIX B (Con't.)

7. The prestige of my engineering position inside the the company (that is, the regard received from others in the company):
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
8. The feeling of worthwhile accomplishment in my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
9. The opportunity for personal growth and development in my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
10. The opportunity for independent thought and action in my engineering position (that is, the opportunity to do things a different way):
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
11. The opportunity to develop close friendships in my engineering position:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
12. The feeling of self-fulfillment a person gets from being in my engineering position (that is, the feeling of being able to use one's own unique capabilities, realizing one's potentialities):
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)
13. The opportunity, in my engineering position, to give help to other people:
 - a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
 - b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

APPENDIX B (Con't.)

14. The feeling of being kept informed, inside the organization, that a person gets from being in my engineering position:
- a) How much should there be? (min) 1 2 3 4 5 6 7 (max)
- b) How important is this to me? (min) 1 2 3 4 5 6 7 (max)

INSTRUCTIONS

Part 2 of this questionnaire consists of a number of statements, you are to respond to these statements using a scale from 1 to 7, with 1=strongly disagree and 7=strongly agree. The terms "work" and "job" in the following questions refer to your job as a student performing school related work.

15. When I do my work well, it gives me a feeling of accomplishment.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

16. When I perform my job well, it contributes to my personal growth and development.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

17. I feel a great sense of personal satisfaction when I do my job well.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

18. Doing my job well increases my feeling of self-esteem.

(strongly disagree) 1 2 3 4 5 6 7 (strongly agree)

19. Write your age in the space below.
- _____

APPENDIX C

Table 8

ANALYSIS OF VARIANCE:
Importance of Security Need

Source of Variance	SS	df	MS	F
Between	6.21	3	2.07	1.03
Linear	6.01	1	6.01	2.99
Quadratic	.03	1	.03	.01
Other Trends	.17	1	.17	.08
Within	130.86	65	2.01	
Total	137.07	68		

	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	6.28	6.06	5.67	5.53

Table 9

ANALYSIS OF VARIANCE:
Social Need Satisfaction

Source of Variance	SS	df	MS	F
Between	.29	2		
Linear	.21	1	.21	.37
Quadratic	.07	1	.07	.13
Within	27.71	48	.58	
Total	28.00	50		

	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$.69	.53	.53

APPENDIX C (Con't.)

Table 10

ANALYSIS OF VARIANCE:
Importance of Esteem Need

Source of Variance	SS	df	MS	F
Between	3.47	3	1.16	1.55
Linear	1.72	1	1.72	2.29
Quadratic	1.50	1	1.50	2.00
Other Trends	.25	1	.25	.33
Within	49.00	65	.75	
Total	52.47	68		

	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	5.47	5.73	5.43	5.10

Table 11

ANALYSIS OF VARIANCE:
Esteem Need Satisfaction

Source of Variance	SS	df	MS	F
Between	3.73	2		
Linear	.64	1	.64	.69
Quadratic	3.10	1	3.10	3.38
Within	44.07	48	.92	
Total	47.80	50		

	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	1.59	1.21	1.87

APPENDIX C (Con't.)

Table 12

ANALYSIS OF VARIANCE:
Importance of Autonomy Need

Source of Variance	SS	df	MS	F
Between	.49	3	.16	.16
Linear	.03	1	.03	.03
Quadratic	.00	1	.00	.00
Other Trends	.46	1	.46	.48
Within	62.66	65	.96	
Total	63.15	68		

	<u>Students</u>	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	5.0	4.84	5.04	4.87

Table 13

ANALYSIS OF VARIANCE:
Autonomy Need Satisfaction

Source of Variance	SS	df	MS	F
Between	.96	2		
Linear	.81	1	.81	1.32
Quadratic	.14	1	.14	.23
Within	29.56	48	.62	
Total	30.52	50		

	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	1.23	1.28	1.54

APPENDIX C (Con't.)

Table 14

ANALYSIS OF VARIANCE:
Self-Actualization Need Satisfaction

Source of Variance	SS	df	MS	F
Between	1.76	2		
Linear	.39	1	.39	.22
Quadratic	1.37	1	1.37	.78
Within	84.57	48	1.76	
Total	86.33	50		

	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	1.67	1.43	1.88

Table 15

ANALYSIS OF VARIANCE
Security Aspiration

Source of Variance	SS	df	MS	F
Between	3.71	2	1.85	1.53
Linear	3.63	1	3.63	3.00
Quadratic	.07	1	.07	.05
Within	58.09	48	1.21	
Total	61.79	50		

	<u>0 - 3</u>	<u>3 - 6</u>	<u>6 - 9</u>
$\bar{X} =$	6.13	5.72	5.47

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