A STUDY OF FACTORS RELATED TO SATISFACTION AMONG SOPHOMORE ENGINEERING STUDENTS AT MICHIGAN STATE UNIVERSITY

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ABSTRACT

A STUDY OF FACTORS RELATED TO
SATISFACTION AMONG SOPHOMORE ENGINEERING STUDENTS
AT MICHIGAN STATE UNIVERSITY

By

Keith Herbert Asplin

Concern over the attrition of talented engineering students has been expressed by engineering educators. Studies conducted for the purpose of shedding light on the problem, while not solving it, have resulted in a recognition of the important part that student dissatisfaction plays in decisions to drop out of engineering. This study was designed to yield a more comprehensive and meaningful picture of satisfaction among engineering students than is presently available.

A statement of theoretical assumptions was presented. It was theorized that satisfaction is a product of the interaction process between the needs of the student and the demands of the college environment. It was hypothesized that the demands created by the curriculum of the College of Engineering, emphasizing as it does, achievement in the technical areas, would affect students such that those possessing higher numerical ability were more likely to be satisfied with their experiences. Likewise, it was hypothesized that students who possessed high verbal ability would be less satisfied with their experiences. It was further hypothesized that students would be dissatisfied with the

rigidity of the curriculum and the fact that there was little provision for meeting the developmental needs of students. Finally, it was hypothesized that satisfaction would be related to the congruence between student expectations and actual experiences.

An experimental sample was chosen from among the sophomore engineering students at Michigan State University. Each subject completed a questionnaire which included a satisfaction scale. The sample was divided into More Satisfied and Less Satisfied groups on the basis of their scores on the Satisfaction Scale.

While the groups proved to be quite similar along some dimensions studied, they were found to be significantly different in the following ways:

1. The More Satisfied students reported spending more time studying than did the Less Satisfied students.
2. The Less Satisfied students expressed the belief that their first two years experience would have been more valuable if it had:
   a) provided more personal contacts with other classes.
   b) allowed more time for social activities.
   c) provided more personal direction in studies and course selection.
   d) provided more emphasis on liberal studies not related to any occupation.

3. The Less Satisfied students had lower expectations than did the More Satisfied students concerning:
   a) the level of achievement in non-technical courses.
   b) the amount of study required to earn a "C" grade in all courses.
4. The More Satisfied students reported feeling more competent and more mature than did the Less Satisfied students.
5. The More Satisfied students expressed having better experiences than had been expected regarding:
   a) opportunities for participation in fraternities and other social groups.
   b) feelings of social "know-how."
6. The Less Satisfied students reported attaining higher levels of achievement in non-technical courses than had been expected.
7. The Less Satisfied students also reported having fewer opportunities to "live-it-up" than they expected.

Both the More Satisfied and Less Satisfied students reported that:

1. Their level of achievement in technical courses was significantly lower than expected.
2. The curriculum contained significantly more theoretical material than expected.

3. There were significantly fewer opportunities to apply their knowledge than they expected.
4. They felt significantly less competent than expected.
5. There were significantly fewer opportunities for boy-girl relationships than they expected.

From the data it seemed clear that the groups differed in some important ways. Most important among them seemed to be differences in levels of expectancies.

Implications were drawn for further research.

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By

Keith H. Asplin

A THESIS

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DEDICATED TO

My Wife, Norma Jo

My Sons, Mike, Terry and Chris

My Daughters, Laura and Jennifer

They seldom knew what it all

meant, but they certainly

know what it all means.

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CHAPTER I

THE PROBLEM

Statement of the Problem

Recent studies by the Bureau of Labor Statistics for the National Science Foundation and by the Engineering Manpower Commission of the Engineers Joint Council not only predict shortages in our technically trained manpower pool during the coming decade but have also developed a widespread concern for the attrition of qualified students from engineering programs throughout the nation.[1] In 1963 the Engineering Manpower Commission reported that among deans of a large percentage of our country's engineering schools, there seemed to be a large area of agreement that:

"1. Large numbers of students who are well qualified for engineering are dropping out.

2. High attrition rates cause student disillusionment which reacts against engineering and is one of the principle causes of the declining freshman enrollments. In other words, 'Why take engineering if the odds are stacked against you?'

3. There are effective ways of reducing student attrition if we would face up to the problem."[2]

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[1]Bridgman, D. S. "Engineering Student Dropouts," Journal of Engineering Education, 50, 1960, pp. 611-619.

[2]Engineering Student Attrition. Engineering Manpower Commission, New York, April, 1963, p. 3.

A recent investigation sponsored by the National Science Foundation and conducted by the American Society for Engineering Education seems to substantiate the belief that over the past several years there has been a trend toward an ever increasing loss of high-quality engineering students to other fields. The ASEE Committee for the Analysis of Engineering Enrollment reports that the retention rates in engineering schools have decreased considerably since 1950. Of the engineering freshmen entering in that year, 63 per cent earned engineering degrees within six years. This percentage has decreased yearly until we find that of those freshmen entering in 1959, only 49 per cent had earned degrees in engineering by 1965.

The study also reveals that the percentage of entering engineering freshmen who change majors and graduate in other divisions has steadily increased. Looking again at the 1950 freshman engineering class, 15 per cent went on to earn degrees in other fields. This percentage has increased yearly until we find that of the freshman engineers entering in 1959, 23 per cent earned degrees in fields other than engineering.[3]

Rather significantly, the first recommendation of the ASEE study group under the leadership of Professor Marvin A. Griffin, suggested "that a major effort be made to insure that a larger fraction of the students who enter engineering successfully complete the degree requirements."[4]

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[3]American Society for Engineering Education, ECAC Committee on Analysis of Engineering Enrollment. Factors Influencing Engineering Enrollment, American Society for Engineering Education, Washington, D. C., October, 1965, p. 33.

[4]"The Future Supply of Engineers." Engineering Manpower Bulletin, No. 6, Engineering Manpower Commission, New York, April, 1967, p. 3-4.

The mounting concern among engineering educators and others interested in the manpower situation has resulted in an increasing number of studies of enrollment and attrition patterns. The bulk of these studies are primarily concerned, however, with projections and analysis of the supply and demand for engineers in the years ahead. The result has been a better understanding of manpower needs but little insight into what might account for declining enrollments and increasing attrition.

As the proportion of students entering engineering has decreased, concern over the attrition rates has increased. As early as 1959 a committee of the American Society for Engineering Education (ASEE) concluded that there was some foundation for the widespread belief that many qualified students were transferring out of engineering programs.[5] The dimensions of the problem were drawn by Heather David in an article on the increasing shortage of engineers and scientists: ". . . about half of each (engineering) class does not make--they flunk out, drop out, and an increasing number switch out."[6]

There are, therefore, considerable gains to be realized by a reduction in these attrition rates. The ASEE study group, mentioned above, observed that - ". . . if engineering attrition were reduced to the level of 1950, the effect would be the same as though freshman enrollment were increased by almost 20 per cent."[7]

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[5]Bridgman, D. S. loc. cit., pp. 618-619.

[6]David, Heather M. "Scientist/Engineer Shortage Worsens," Missles and Rockets, 10, No. 1, January 1, 1962, 12.

[7]Ibid., p. 5.

For almost a decade the College of Engineering at Michigan State University (M.S.U.) has been studying the problem of attrition. In 1959 J. D. Ryder, then Dean of the College of Engineering, began a three year survey aimed at assessing the reasons for students transferring out of the College of Engineering.

This survey of students who dropped out of engineering identified several sources of dissatisfaction among them; the large number of credits required to earn a degree in engineering (212 credits versus 183 in most other majors), and the excessive number of hours of laboratory time required per credit hour carried.[8]

After careful consideration of these complaints and the changing emphasis from applied to theoretical studies within the field of engineering itself, certain modifications were made in the curricula of the college. The total number of credit hours required to earn a degree in engineering was brought more in line with other technical majors and courses requiring laboratory work were consolidated and reduced in number. It was hoped that these changes would result in greater student satisfaction and consequently, higher retention rates. Such was not the case, however, as no significant reduction in student attrition occurred.[9]

The surveys conducted by Dean Ryder, while not solving the problem of attrition, did result in a recognition of the important part that student dissatisfaction plays in decisions to drop out of engineering.

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[8]Ryder, J. D. "Response of 1959 Engineering Freshmen to a Request for Information Covering Reasons for Dropout," College of Engineering, Michigan State University, East Lansing, Michigan, February, 1962.

[9]Interview with G. M. Van Dusen, Assistant Dean, College of Engineering, Michigan State University, January, 1968.

But what of those students who remained in engineering? How satisfied are they? And what factors contribute to their satisfaction or lack of it?

Those who counsel engineering students encounter many manifestations that not all students are equally satisfied with their college experience. While the nature of the statements students make may indicate something of his feelings regarding his college experience, they do not enable one to assess with any degree of certainty, the true extent of the feelings, the reasons for them, nor which may be more important, the extent to which they are characteristic of all students within the college.

This study is designed to yield a more comprehensive and meaningful picture of satisfaction among students who are currently enrolled in the College of Engineering than is presently available. It is hoped that such a study will provide a more meaningful reference point from which the further study of student attrition can be undertaken.

Purpose of the Study

It is the purpose of this study to investigate satisfaction among sophomore engineering students at Michigan State University. Four goals consistent with this purpose have been established to guide the research:

1. To better understand the expectations and concerns of those students who choose engineering as their college major.
2. To identify factors which may be related to student satisfaction within the College of Engineering.
3. To determine what relationships, if any, exist among a student's level of ability, his level of academic achievement and his level of satisfaction.

4. To formulate hypotheses, whenever possible, to serve as a basis for further investigations.

A descriptive approach seems most appropriate in light of the lack of information available concerning satisfaction among engineering students. A statement of the theoretical background follows.

Theoretical Background

Psychologists, sociologists, educators and others are giving increasing attention to some of the subtle but highly significant factors related to student satisfaction. The developmental needs and concerns of the student, as well as the physical environment in which he lives and the social institutions and processes of which he is a part are examples of the new emphasis. Studies of these factors, such as those by Stern, Argyris, and Brown, increasingly emphasize the importance of the interaction of these factors in an individual's adjustment.[10,11,12]

Argyris postulates that there exists a basic incongruency between the needs of healthy individuals and the demands of formal organizations. Although Argyris believes it unlikely that organizations and individuals can be completely congruent, he does think it possible that the congruence between an individual and his organization, in this case, his college, might challenge the individual to further growth. He sees individual

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[10]Stern, George G. "Environment for Learning," The American College, Nevitt Sanford (Ed.), John Wiley & Sons, Inc., New York: 1962.

[11]Argyris, Chris. Integrating the Individual and the Organization, John Wiley & Sons, Inc., New York: 1964.

[12]Brown, Roberta D. Student Characteristics in Relation to Adjustment in Two Different College Environments, Dissertation Abstracts, 27 (3-A), 1966, pp. 596-597.

frustration and dissatisfaction as the result of too high a level of incongruence, resulting in blocking of self expression.

It is, therefore, theorized that the "satisfaction" or "dissatisfaction" of engineering students with their college experience is a product of an interaction process between the needs of the student and the demands of his college environment. It is a feeling that reflects how well an individual is able to resolve the conflicts which arise between his developmental needs and the environmental demands.

This interaction of a student with his environment is conceptualized as a process of reciprocation. The environment acts upon the student and the student acts upon the environment; the action of each being influenced by the reaction of the other. This interaction process can be examined from two different points of view. From the student's point of view, satisfaction is a measure of how successfully he fulfills his conscious or unconscious needs and achieves his goals in the college environment.

Although early personality theorists tended to neglect this period of time in the formation of personality, increasing interest in the ego functions, as well as, concern for the nature and structure of student discontent has resulted in greater appreciation of its importance among recent investigators.

Erikson has described the issues of this period as identity versus identity diffusion, and intimacy versus isolation.[13,14,15] He feels that

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[13]Erikson, Erik H. Childhood and Society, W. W. Norton & Co., New York: 1963.

[14]Erikson, Erik H. "Growth and Crisis of the Heathy Personality," in Kluckhorn, C. and Murray, H. (Eds.), Personality in Nature, Society, and Culture, 2nd Ed., Knoph, New York: 1953, pp. 185-225.

[15]Erikson, Erik H. "The Problem of Ego Identity," Psychological Issues, Vol. 1, 1959, pp. 101-164.

the individual must either grow towards an increased awareness of and confidence in who he is and where he is going or he will remain unable to define himself adequately or effectively deal with life.

Sullivan also sees the issues during this period of life as centering around the need for intimacy, for heterosexual activity, and most important of all, the stabilization of the self system.[16,17] Growth towards maturity means acquiring an understanding of the limitations, interests, possibilities, and anxieties of oneself and others.

The concepts of natural growth described by White also emphasize the importance of this period.[18] He describes four directions of change:

> 1) A "Stabilizing of the Ego Identity"; 2) A "Freeing of Personal Relationships"; 3) A "Deepening of Interests"; and 4) A "Humanizing of Values."

All of these theorists see the clearer and more precise differentiation of self as the prime concern of this developmental period. They also recognize an increasing need for meaningful heterosexual relationships.

In contrast to the above viewpoint, however, one might focus upon the environment as making certain demands upon the student. From this point of view, satisfaction can be interpreted as a measure of "fit" - or of how successful the student has been in meeting the demands imposed upon him. In this approach the environment can be conceptualized as a

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[16]Sullivan, Harry S. Conceptions of Modern Psychiatry, W. W. Norton & Co., New York: 1940.

[17]Sullivan, Harry S. The Interpersonal Theory of Psychiatry, W. W. Norton & Co., New York: 1953.

[18]White, Robert W. Lives in Progress, Dryden, New York: 1952.

culture; exhibiting certain patterns of belief and behavior. In effect the university exhibits two major cultural patterns, that of the administration and that of the student body, although many subcultural patterns exist within the different colleges, departments, and student groups.

All of these cultural groups make demands upon the student. The demands of the administrative culture are usually quite formalized, having been written into rules and regulations. The demands of student groups or the peer culture are no less insistent, however. Decisions regarding proper dress, dating behavior, and study habits are not left completely to the discretion of the individual.

The result of this interaction between the student and his environment is that every university and college tends to develop a unique character of its own. Elements of this special character are recognized by non-members and become the basis for stereotypes.

In as much as all students differ with regard to abilities, attitudes, it seems reasonable to assume that some will be better equipped to meet the demands of the environment. These students will experience less strain and stress in their adjustment efforts, will "fit" better than others, and therefore, should feel more satisfied with their experience.

By the same token, the College of Engineering at M.S.U. by virtue of its own special character and limitations, either provides or restricts the opportunities that a student has to meet his various needs. It is recognized that the imminence of adult life focusing as it does, around the job and marriage, confronts the student with important and persistent questions concerning himself ("Who am I?"), the nature of his vocational choice and his heterosexual relationships. The nature of the interaction

between the student and his college environment will determine the extent to which he is able to provide answers to these questions and consequently, the level of satisfaction that results.

It is, therefore, with the above orientation that the study of satisfaction among sophomore engineering students is undertaken.

Research Hypotheses

It is the purpose of this study to provide descriptive information concerning satisfaction among sophomore students in the College of Engineering. The following research hypotheses are suggested to test the underlying assumptions of the study. They are restated in operational form in Chapter III.

1. The curriculum of the College of Engineering, stressing as it does, achievement in the technical areas more than achievement in the non-technical areas will affect students in the following ways:
   a) Those students possessing higher numerical ability will be more satisfied with their experience than those with lower numerical ability.
   b) Those students possessing higher verbal ability will be less satisfied with their experience than those with lower verbal ability.
2. Dissatisfaction will be expressed concerning the rigidity of the curricular requirements and lack of provision for meeting the developmental needs of students, such as those mentioned by Erikson, Sullivan and White.

3. The closer the college experience comes to meeting the expectations of the student, the more satisfied he will be.

Limitations of the Study

This study is limited in the following ways:

1. The study is limited to the study of 79 sophomore engineering students enrolled during the 1967-68 academic year at Michigan State University.
2. The study is limited to data gathered by means of a specially designed questionnaire that required the students to recall expectations they had two years previously.
3. The study used as measures of ability; the Verbal, Numerical, and Total scores from the College Qualification Test.
4. The study used as a measure of academic achievement, the accumulative academic grade point calculated by the Registrar's Office at Michigan State University.
5. The study is limited to the use of the mean rating of three independent raters for the questions that inquired as to the student's expected and actual experiences.

Dissertation Plan

Chapter I has presented a brief statement of the need and importance of this study and has also provided a theoretical structure from which several research hypotheses were derived.

A review of the literature pertaining to student satisfaction and student environmental interaction will be presented in Chapter II.

Chapter III will contain a description of the sample and instruments used in the study and will provide a statement of the statistical hypothesis and methods of analysis. The results of the study will be presented in Chapter IV, and a discussion of the findings will follow in Chapter V. Chapter VI will include a summary of the findings, a statement of the conclusions and suggestions for further research.

CHAPTER II

REVIEW OF THE LITERATURE

The literature on student satisfaction is rather limited, especially in comparison to that which deals with worker satisfaction. Nevertheless, there are some studies that have dealt directly with student satisfaction. In addition to these there are studies which are tangentially related to the subject.

Because it would be beyond the scope of this study to cover all of the related literature, the review which follows will be limited to: 1) a detailed review of closely related studies, 2) a survey of research concerning the interaction between students and their environment, and 3) a brief survey of studies tangentially related to the subject under investigation.

Studies of Student Satisfaction

One of the most extensive studies concerning student satisfaction has been done by Peterson.[1] He derived four scales: satisfaction with (1) Faculty (SF); (2) Administration (SA); (3) Major (SM); (4) Students (SS); from the College Student Questionnaires and then related scores on these satisfaction scales to each other and to a number of personality

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[1]Peterson, R. E. College Student: Some Hypotheses Based on Questionnaire Data, Unpublished Manuscript (Mimeo), Educational Testing Service, Princeton, New Jersey: 1965.

and demographic variables. He then derived a number of hypotheses based on these relationships. Among his hypotheses were the following:

1. The Discontent-as-Global Hypothesis

   Educational discontent in college students is essentially a global characteristic, i.e., discontent with one aspect of ones condition at college tends to be related to discontent with other areas of this condition.

2. The Institutional Size Hypothesis

   Magnitude of student discontent varies directly with size of the student body.

3. The Grade Getting Hypothesis

   Magnitude of student discontent varies inversely with grade-getting ability.

This hypothesis was based on a comparison of mean scores of the four satisfaction scales for two groups of students classified as "grade-getters" (n=115) (students with a cumulative grade point average of B+ or better), and "grade-non-getters" (n=118) (students with a cumulative grade point average of C- or less). The mean satisfaction scores of the "grade-getters" were significantly different from the "grade-non-getters" on three of the four satisfaction scales, SF (t=5.39); SM (t=3.97); SS (t=3.28).

Davie utilized a sociological and statistical approach to the study of the problem of satisfaction with college.[2] The purpose of his study

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[2]Davie, James S. "Satisfaction and the College Experience," in Psychosocial Problems of College Men, B. M. Wedge (Ed.), Yale University Press, New Haven: 1958.

was twofold. From a practical viewpoint it sought to obtain a clearer picture of the undergraduate scene in order to better understand the student culture. His more technical purpose was to determine whether one could measure satisfaction with the college experience through questionnaire methods and if so, to identify some of the types of factors associated with different degrees of satisfaction.

Davie sent questionnaires to random samples of the Yale classes of 1953, 1954, 1955, and 1956 in the spring term of their senior years. The sample percentages for the study were 20, 40, 25, and 25 and the percentage of the samples returning the questionnaires were 80, 75, 79, and 78.

The findings indicate that satisfaction at Yale is related to social and personal background factors as well as to characteristics of the student's experience at Yale. Those students who experienced the least discontinuity between their secondary school experience and college experience tended to be the most satisfied.

In a study of student satisfaction at Pennsylvania State University, Lindsay and Marks presented a model for student satisfaction based on a modification of the Herzberg theory of worker satisfaction.[3] They employed a 3 x 3 x 2 factorial design to assess the effect of different levels of motivators (achievement), hygienes (university rules and regulations), and n-achievement on overall student satisfaction. They found that motivators accounted for 8 times as much variance (.669) in overall satisfaction as did hygienes (.079), and concluded that a student's level of achievement is an important factor in his overall satisfaction.

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[3]Lindsay, C. A. and Marks, E. Student Satisfaction: An Exploratory Study and Proposed Model, Student Affairs Research Report, No. 66-2, Unpublished Manuscript (Mimeo), The Pennsylvania State University: 1967.

In a more recent study, Lindsay examined the relationship between a single measure of overall student satisfaction with academic experiences, current academic achievement, and three routine predictors of college achievement--high school grade point average, aptitude, and n-achievement.[4] No particular hypotheses were entertained, as it was an exploratory study, but the author did feel that the student satisfaction and achievement would be monotonically related.

While admitting the limitations of a correlational design, the fact that the measure of satisfaction was a single question and subject to different interpretations by the subjects and the relatively small number (n=114) of subjects employed in the research, Lindsay offers the following conclusions.

"1. Reported feelings of satisfaction with academic experiences appearing to be related to both present and past achievement for college students.

2. Rather than attempt to explicate the causal relationship between satisfaction and achievement, it seemed most appropriate to regard the relationship of those two variables as a concomitant one.

3. While both aptitude and overall satisfaction are significantly related to achievement, aptitude and feelings of satisfaction are not significantly related.

4. Overall satisfaction with academic experiences bears a

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[4]Lindsay, Carl A. Some Correlates of Overall Student Satisfaction and Achievement, Student Affairs Research Report, No. 67-3, Unpublished Manuscript (Mimeo), The Pennsylvania State University: 1967.

stronger relationship to current achievement than does aptitude."[5]

Keith administered The College Characteristics Index and Activities Index to a sample of undergraduate students who had completed at least four semesters of work in residence at the University of Alabama.[6] His purpose was to determine what relationship, if any, the congruency of environmental press and student need systems had to reported student satisfaction and academic success.

No significant relationships were found between the congruency index scores and academic success or reported personal satisfaction with the institution. Keith observed, however, that the congruency index scores were unusually low and that the variance and range were restricted and expressed the opinion that this may have caused the lack of significant correlation.

In an exploratory study conducted at Sarah Lawrence College, Taylor attempted to identify factors which contributed to high or low morale.[7] As subjects he chose a group of student committee members, members of the Student Council, the presidents of student houses, and a variety of other students.

He found that when asked to list their most satisfying experiences, the majority of students mentioned such factors as "intellectual experience" and "general intellectual achievement." Taylor had expected to

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[5] Ibid., p. 12.

[6] Keith, James A. "The Relationship of the Congruency of Environmental Press and Student Need Systems to Reported Personal Satisfaction and Academic Success," Dissertation Abstracts, 25 (4), 1965, pp. 7081-7082.

[7] Taylor, H. Freedom and Authority on the Campus, in The American College, N. Sanford (Ed.), John Wiley & Sons, Inc., New York: 1962.

find a fairly large number of students who highly valued the degree of personal freedom granted on campus or the richness of the cultural life available, but only 3 per cent of the students mentioned activities outside their courses as being their most satisfying experiences at the college.

This dominant concern with the curriculum was re-emphasized when students were asked to list their least satisfying experiences. The sources of discontent were found to be in the same places as the sources of satisfaction--in the work courses. Most often listed as least satisfying experiences were disappointments in a course, in a teacher, or in social relationships.

Phillips, using a random sample of 109 Dartmouth College students, examined the costs and gains resulting from deferring gratification in a college setting.[8] He hypothesized that the greater the frequency of deferring social gratification, the greater would be the student's satisfaction with his academic experience at college. He further hypothesized that the greater the frequency of deferring social gratification, the poorer the student's mental health would be.

Phillips' results supported both of these hypotheses. He pointed out, however, that difference between short-run and long-run perspectives might alter the results. In the short-run (that is, in one to four years of college) the disadvantages of deferring gratification from social sources seem to outweigh the advantages; the student gains more academic

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[8]Phillips, Dereck L. "Deferred Gratification in a College Setting: Some Costs and Gains," Social Problems, 13 (3), 1966, pp. 333-343.

satisfaction but at some cost to his social satisfaction and his mental health. It is his contention, however, that in the long-run, the deferring student may end up with a profit. For instance, because of his academic satisfaction he may continue longer in school, perhaps being more anxious than other students to go on for advanced degrees, and thus eventually placing himself in an occupation where he enjoys greater job satisfaction, as well as, greater earnings than his non-deferring classmates.

It should be emphasized, however, that these last statements are purely supposition and not based on data collected within the limits of the study.

Studies Concerning Individual-Environmental Interaction

In an analysis of relationships between student personality needs and the psychological press of college environments, Stern concluded that there exists sufficient evidence to warrant the conclusion that the interaction scheme is useful for the purpose of characterizing some of the important aspects of student ecology.[9] Stern's data were based on a selected group of 32 schools, reflecting in equal degrees the characteristics of a small number of universities, denominational colleges, private liberal arts colleges, and technical schools, the latter including teacher preparatory, business administration, and engineering programs. Stern makes the further suggestion that student apathy might be the consequence of unfulfilled expectations in the transition from high school to college.

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[9]Stern, George G. "Environment for Learning," The American College, Nevitt Sanford (Ed.), John Wiley & Sons, Inc., New York: 1962.

Argyris reports a study based upon his theory that the degree of "fit" between an individual and the institution in which he finds himself will affect the individual's motivation, affective experiences, and performance.[10] Quantitative indices for motivation and provision of self actualization, status, and social congruency were administered to a group of research scientists. It was found that measures of "objective congruence" (the individual's motive on a given dimension compared to the average perception of provision for that motive by members of his department) were not significantly correlated with motivation. Measures of "perceived congruence" (the individual's motive compared to his perception of the institution's provision for that motive) were significantly correlated with motivation, but neither measure was significantly correlated with performance.

In a longitudinal study of 147 students at University College in London, Kelvin, Lucus, and Ojha examined the relationships between personality, mental health, and academic performance in university students.[11] Utilizing data gathered from questionnaires (covering educational and academic record, class, social activities, parental relations, aspirations, etc.) intelligence tests, personality tests, clinical records, and records of academic performance, they attempted to show that there were some systematic relations between those scores and distress and performance. It was their contention that the ultimate behavior of a student is a function both of his own personality and the nature of the institution

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[10]Argyris, C. loc. cit., pp. 42-47.

[11]Kelvin, R. P., Lucus, C. J., and Ojha, A. B. "The Relation Between Personality, Mental Health and Academic Performance in University Students," British Journal of Social and Clinical Psychology, 4 (4), 1965, pp. 244-253.

he attends. They concluded that psychological distress cannot be avoided in a student population and suggested that ". . . such distress may merely be an unfortunate aspect of a quality which is in itself valuable but may go awry-high drive."[12] A further conclusion was that it would be undesirable to eliminate distress on campus by careful selection of students, in as much as this would result in the elimination of some of the most promising potential students. They also found that distress did not necessarily interfere with the highest level of academic achievement. While distress is not deplorable as such, they concluded, it becomes deplorable when it reaches excessive proportions resulting in unnecessary academic (and therefore, economic) wastage through lack of adequate management.

Not all studies have supported the concept of individual-environmental interaction, however. Brown conducted a study comparing 169 students from two different schools, one public and one private, in an effort to see whether students might have greater potential development in one climate than another.[13] The differences that she found were congruent with the purposes of state supported schools to serve the general public and ambition of the private schools to serve a more select clientele. Tests of relationships and interaction, however, failed to reveal any subtle advantages or disadvantages of either environment for particular types of students.

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[12] Ibid., p. 253.

[13] Brown, Roberta D. loc. cit.

Studies of Factors Related to Transferring or Dropping Out

Pervin conducted a study of Princeton dropouts from the classes of 1940, 1951 and 1960.[14] Every dropout from these classes was sent a questionnaire that covered four areas: (1) reasons for withdrawal and services consulted prior to withdrawal; (2) immediate and long-term effects of withdrawal; (3) later academic performance and reasons for later academic failure or success; and (4) later personal and vocational success, physical and emotional health.

One of the findings he summarized as follows:

"Academic ability alone appears to play a minor role in determining which Princeton students drop out and cannot be used effectively in attempts at prediction. We need to know more about motivational factors in relation to academic performance and dropping out. Two areas which would appear to be worthy of investigation are the effects of frustrated expectations on students, and the question of student - college fit leading to satisfaction or dissatisfaction with ones college."[15]

In a more recent study of student dissatisfaction and college dropouts, Pervin and Rubin hypothesized that the greater the extent to which a student sees himself as not "fitting in" to the college, the more he

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[14]Pervin, Lawrence A. "The Later Academic, Vocational, and Personal Success of College Dropouts," The College Dropout and the Utilization of Talent, Pervin, L. A., et.al., (Ed.), Princeton, Princeton University Press: 1966.

[15]Ibid., p. 52.

will be dissatisfied with the college and consider dropping out.[16] They further hypothesized that this relationship would be stronger for non-academic than for academic satisfaction and for dropping out for non-academic (personal) reasons than for academic reasons. Although their data supported these predictions, it should be noted that their data were based on the reported probability of dropping out rather than the actual behavior of dropping out.

Augustine conducted an extensive study of freshman and sophomore engineering students at three midwestern universities.[17] It was the purpose of his study to identify factors causally related to persistence and change in major field of academically proficient engineering students. As part of this study he conducted interviews with a total of 176 students-104 persisters and 72 non-persisters.

Among his reported findings are the following which are of particular relevance to this study.

"1. Respondents indicate that the early years of their college programs are often frustrating and anxious periods during which they must work out a multitude of personal and social problems while clarifying their educational and career goals.

2. There is widespread dissatisfaction among students interviewed with the highly structured inflexible

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[16]Pervin, L. A. and Rubin, O. B. "Student Dissatisfaction with College and the College Dropout: A Transactional Approach," Journal of Social Psychology, 72 (2), 1967, pp. 289-295.

[17]Augustine, Roger D. "Persistence and Attrition of Engineering Students," Michigan State University, East Lansing, Michigan, August, 1966.

engineering curriculua. These feelings are expressed by both persisters and non-persisters."[18]

Augustine also states that while non-persisters cite a variety of reasons for changing out of engineering, those most frequently mentioned include:

"a) Students had mistaken impressions of the engineering field.

b) Students were dissatisfied with the content of the required courses.

c) The student's scholastic performance did not meet his self-expectations."[19]

Discussion

A review of the literature since 1955 revealed no study of satisfaction among engineering students. It also revealed that the subject of student satisfaction has only recently become a matter of concern as writers have been contributing increasing attention to it, especially during the last five years.

Those studies which have dealt with relationships among aptitude, achievement, and satisfaction for college students were reviewed. These studies indicated that while both aptitude and satisfaction may be related to achievement, there is little reason to believe that aptitude and feelings of satisfaction are significantly related. Rather than attempt- to explicate the relationship between achievement and satisfaction, it

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[18] Ibid., p. 63.

[19] Ibid., pp. 64-65.

was suggested that it might be appropriate to consider the relationship as one of concomitance.

In a further review of the literature, those studies concerning individual-environmental interaction were examined. These studies seemed to indicate that the relationship between personal needs and the demands of the environment might well influence a student's overall satisfaction. Support was also offered for the notion that student satisfaction might be the result of unfulfilled expectations in the transition from high school to college.

Evidence supporting a relationship between congruence of expectation and actual experience to student satisfaction was also found in a survey concerning the sources of student discontent. Students most often listed as least satisfying experiences, disappointments in a course, in a teacher, or in social relationships.

Support was also offered for the existence of a relationship between the frequency of deferring social gratification and ones level of satisfaction.

Many of the studies reviewed referred to the importance of considering the question of student-college fit and the interaction between them when exploring the question of student satisfaction. The review also demonstrated that the questionnaire approach to the gathering of data concerning student satisfaction has been widely used.

Another conclusion drawn from the review is that the criteria of satisfaction chosen has varied as much as the settings in which they were conducted. They have apparently been chosen at the discretion of the researcher, and are probably a function of his own interests.

In Chapter III the overall design of the study will be presented and the research hypotheses will be stated in operational form.

CHAPTER III

THE EXPERIMENTAL DESIGN

This study was designed and directed toward securing information thought to be related to student satisfaction. After analyzing the problem to be studied and reviewing the related research, attention was directed as to what research procedures should be used.

It was necessary to restate the research hypotheses in testable form, select the sample population, type of instrumentation to be used to gather the data, and decide upon the methodology and procedures to be used in collating and recording the data.

Statistical Hypotheses

The research hypotheses stated in Chapter I are presented in testable form below using information collected in the review of literature and being structured to apply to the experimental sample.

In the following statements, the students who scored above the median for the group on the satisfaction scale will be referred to as the More Satisfied (MS) students and those students who scored below the median will be referred to as the Less Satisfied (LS) students.

Hypothesis 1

Null Hypothesis: There will be no difference between MS students and LS students on the basis of numerical ability.

Alternate Hypothesis: Levels of numerical ability will be higher for MS students than for LS students.

Hypothesis 2

Null Hypothesis: There will be no difference between MS students and LS students on the basis of verbal ability.

Alternate Hypothesis: Levels of verbal ability will be lower for the MS students than for LS students.

Hypothesis 3

Null Hypothesis: There will be no difference between MS students and LS students with regard to their opinions of what changes would have made their first two years experience more valuable.

Alternate Hypothesis: LS students will express greater concern over the rigidity of the curriculum and its lack of provision for meeting non-vocational developmental needs of students such as those mentioned by Erikson, Sullivan and White.

Hypothesis 4

Null Hypothesis: There will be no difference between MS students and LS students in terms of their expectations and actual experiences during their first two years as engineering students.

The Sample

Several factors were considered in the selection of the sample for this study. First of all, in order to test the theoretical assumptions

of the study, it was necessary that the sample consist of individuals who had experienced, to the greatest extent possible, the same environmental conditions. In this case primary concern was for similarity of experience with course work and instructors.

Discussions with Van Dusen, Assistant Dean for Student Affairs in the College of Engineering, revealed that the great majority of students take a similar course load, during their first two years of study.[1] Upon acceptance into upper-college, however, students begin to pursue the more individualized programs of study, characteristic of the various majors within the college. The greatly varied nature of this experience resulted in a decision to exclude juniors and seniors from the sample. Students who had transferred from another institution were excluded for similar reasons.

Further consideration of the population remaining (freshmen and sophomores) resulted in a decision to choose a sample consisting of third term sophomores. Such a sample would be characterized by maximum exposure to the same curricular experiences.

In an effort to minimize the loss of data resulting from incomplete or unreturned questionnaires, it was decided that the instrument would be administered during a regular class period. This course of action was taken on the recommendation of research consultants in the College of Education. Their experiences had revealed that returns from lengthy questionnaires administered by mail are very poor.

Efforts to obtain a representative sample resulted in the selection

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[1]Interview with George M. Van Dusen, Assistant Dean, College of Engineering, Michigan State University, April, 1968.

of a course in mechanics, required of sophomore students in Metallurgical, Civil, Mechanical, and Agricultural Engineering.

Having received the permission of the Dean of the College and the Departmental Chairman, the three instructors who taught the course were contacted and agreed to relinquish a class period during which the questionnaire could be administered. This provided a sample population of 103 students. The exclusion of off sequence juniors and transfer students from this population resulted in a final sample consisting of 79 students.

Instrumentation

A questionnaire was designed to gather data relevant to the purpose and goals of the study. The development of this instrument was guided by the following objectives:

1. To assess the nature and importance of each student's expectations regarding his college experience:
   a. academic achievement -- the level aspired for and the amount of effort required to obtain passing grades.
   b. social opportunities -- the amount of heterosexual contact, whether it would be in groups or on an individual basis and the feelings of social "know-how" that would result.
   c. maturational changes -- the meaning of increased emotional and financial independence and self-knowledge.
2. To assess the level of satisfaction and obtain information regarding factors which might be related to it:

a. social -- the impact of "going steady," or being engaged or married, the relationship of dating behavior and frequency of "bull sessions" with other students.

b. organizational -- the amounts of time allocated to sleeping, studying, entertainment, etc.

3. To assess the nature of the opinions expressed by students:

a. goals of college -- the extent to which students see the goals as efforts to prepare them for vocation, integrate individuals into society, instill moral values and provide for better mental health.

b. college life -- aspects that contribute to overall development and the extent to which it is enjoyable.

c. curriculum -- the extent to which they perceived it as applied or theoretical, whether they saw it as rigid or flexible, the opportunities they had for extracurricular activities, etc.

The Questionnaire

The purpose of the questionnaire was to collect certain data from each subject. The questionnaire attempted to elicit the student's feelings about his experiences within the College of Engineering. The following is a detailed discussion of the rationale underlying each part of the instrument. It's development and format were guided by considerations offered by consultants from the office of Educational Research, in the College of Education at Michigan State University. A copy of the questionnaire is included in Appendix A.

The first section of the questionnaire (items 1-6) consisted of a satisfaction scale. The questions that composed this scale were based on Davie's hypothetical portrait of a satisfied student.[2] Davie describes a satisfied student as ". . . one who has been successful in handling internal needs and external pressures. . ." and possesses the following general characteristics:

> "while in college he would not have considered leaving; he would not have felt uncomfortable or 'out of place'; and he would have been in good spirits most of the time."[3]

Items 7 through 15 were concerned with the student's expenditure of time. The items were designed to elicit information regarding how much time was spent in activities other than study.

Item 16, which was concerned with the goals a student thought a university ought to have, was included for descriptive purposes.

The student's opinion as to the importance of various elements of the environment to his overall development, was examined in item 17, and the degree to which he found each of these elements enjoyable was considered in item 18.

In the third section of the questionnaire (items 19-33) a list of 15 possible recommendations for changes within the College of Engineering was presented. Students were asked to indicate how their experience might have been improved by stating whether or not they would approve of the recommended change. These items were included in an effort to learn what students felt to be some of the shortcomings of their experience.

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[2]Davie, James S. loc. cit.

[3]Ibid., p. 31.

The final part of the questionnaire contained 26 open-ended questions concerning students' expectations about various aspects of undergraduate life and the degree to which these expectations were realized. Scores for these items were obtained by taking the mean ratings of three independent judges.

The length of the questionnaire and the nature of the answers required gave rise to some concern about the length of time that would be required to complete it. Accordingly, a pilot study was done, using as subjects, 5 junior students. The times required to complete the questionnaire varied between 30 and 45 minutes. The pretest also showed the form of the questionnaire to be satisfactory for the purpose of this study. Therefore, no significant changes were made in the questionnaire. No problems were anticipated with students failing to complete the questionnaire as the class periods during which they were to be administered were 50 minutes long.

A word must be said concerning the reliability and validity of the information gathered by the questionnaire. Such an instrument relies heavily upon the investigator's ability to engender a cooperative attitude on the part of each subject and to elicit full and accurate responses to the questions posed. The professional experience gained through the advising and counseling of students in the College of Engineering was of great assistance in obtaining this cooperation. An analysis of the data from the pretest of the questionnaire suggested that the requirement of reliability had been fulfilled. It must be pointed out, however, that no statistical tests of reliability such as the familiar test-retest, odd-even, or split-half techniques were employed.

The most familiar procedure for determining validity of an instrumant is the simple demonstration of a relationship between the measures made by the instrument and some criterion. The contention that the satisfaction scale is measuring satisfaction is supported by the findings that the MS students say that they are more satisfied with their college experience than do the LS students and that in general they are satisfied, not dissatisfied people. It was decided, therefore, that the scale is valid for the prediction to the stated criterion, namely, satisfaction.

College Qualification Test (CQT)

The CQT is administered to all incoming freshman students at Michigan State University. The results from this test are part of the student's permanent record at M.S.U. and, as such, were available for use in this study.

The CQT is a test of academic aptitude. Tests of verbal ability, information based upon social studies and scientific knowledge, and numerical reasoning are included. The test thus provides three subscores and a total score indicative of academic aptitude.

Validity studies on the CQT have been conducted in terms of its ability to predict the first term grade point averages of high school seniors entering college. An overall coefficient of .44 for men on the CQT total score has been reported.[4] Test-retest and corrected split-half methods of determining reliability have yielded coefficients varying from .89 to .97.[5]

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[4]Bennett, G. K., Bennett, M. G., Wallace, W. L., Wesmon, A. A. College Qualification Tests: Manual, The Psychological Corporation, New York: 1961, p. 49.

[5]Ibid., p. 53.

Grade Point Averages

Accumulative grade point averages are computed by the registrar for all students at the end of each term. Access to student records made these data readily available for inclusion in the study.

Analysis

The analysis of the data in Chapter IV will be presented in two forms. The first form will consist of a descriptive analysis interspersed with tables to provide as meaningful a view of the data as possible.

The second form will consist of tests of the research hypothesis found in Chapter I and restated in Chapter III in operational form. The .05 level of significance will be used as the criterion for rejection of the null hypothesis, except in those cases where tests of significance must be on the basis of mean ratings. The effect of grouping students on the basis of mean ratings is to reduce the number of students who are placed in the extreme groupings. The probability of obtaining differences that are significant at the .05 level is thereby reduced. In such cases and at the suggestion of Dr. G. Rao, research consultant in the College of Education at Michigan State University, the .10 level will be used as the criterion of significance. By doing so, the chance of making a Type II error, accepting the null hypothesis when it is false, is reduced. Although this increases the likelihood of making a Type I error, accepting the alternative hypothesis when the null hypothesis is true, it was felt that such a compromise was warranted.

The assumptions underlying the statistical models used in analyzing the data are presented and discussed below.

Assumptions: Product Moment Correlation

The use of the product-moment correlation assumes linearity of regression, homoscedasticity, and normal distributions of the variables.[6] For the purpose of this study it is assumed that the experimental sample is representative of a population having the characteristic being studied, normally distributed within it. An informal inspection of the data did not indicate any radical departures from these assumptions.

Assumptions: t-Test

It is an implicit assumption when the *t*-test is used in the evaluation of the difference between two means that the population variances from which the samples are drawn are equal.

In addition, the use of the *t*-test involves the assumption of normal distribution of the "numerator" variable. Edwards points out, however, that departures from normality are only of concern when sample sizes are small.[7] The smallest samples involved in the basic use of the *t*-test in this study included 39 subjects. With groups of this size, departures from normality should not invalidate the conclusions drawn.

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[6]McNemar, Quinn. Psychological Statistics, John Wiley & Sons, Inc., 2nd Ed., New York: 1955, pp. 122-143.

[7]Edwards, Allen L. Experimental Design in Psychological Research, Holt, Reinhart, and Winston, New York: 1960, p. 112.

Assumptions: Chi-Square

The non-continuous data will be analyzed by means of a chi-square analysis.

Careful consideration of the underlying assumptions suggested that it would be appropriate in this situation.[8] Adequate sample size, independence of observations, a sound basis for categorizing results and other relevant attributes led to this conclusion.

The chi-square test enabled the research to examine frequencies of the respective contingency tables to determine whether or not the two variables were independent.

Summary

A sample of 79 full-time sophomore students were tested with a 59 item questionnaire especially constructed for this study. A group of 39 students were designated as More Satisfied (MS) and a group of 40 students were designated as Less Satisfied (LS) on the basis of their score on a satisfaction scale included in the questionnaire.

For each individual the scores on the College Qualification Test and the accumulative grade point averages were collected. A series of 5 hypotheses concerned with student satisfaction were presented and will be tested through an analysis of the data collected.

Product-moment, *t*-test and chi-square techniques will be used to test for significant differences between the groups with the criterion for significance being set at the 95 per cent level. Descriptive data

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[8]McNemar, Quinn. Psychological Statistics, John Wiley & Sons, Inc., New York: 1962, pp. 217-219.

will be presented in forms convenient to the presentation.

The results of the study will be presented in Chapter IV.

CHAPTER IV

ANALYSIS OF THE DATA

The information gathered in this study has been presented in tables designed to give the reader the clearest possible view of the data. These tables are accompanied by a narrative presentation in order to focus attention on the more significant descriptive statistics that are the basis for the conclusions and implications presented in Chapter V.

Before turning to the findings, it is appropriate to consider the question of how representative the sample used in this study is of the entire sophomore class. Academic aptitude scores from the College Qualification Test (CQT) and grade point averages were chosen as the basis for comparison.

In as much as both of these dimensions will be examined in the study, it was decided that they would serve as the most stringent test of whether or not the study sample was truly representative of the total sophomore class. Accordingly, a sample (n=84) consisting of 25 per cent of the sophomore engineering students was selected at random and CQT total scores and accumulative grade point averages were obtained for each student. The results of the *t*-tests between the means of the sets of numerical scores are reported in Table B1 in Appendix B. No significant differences were found at the .05 level between either the academic aptitudes or the accumulative grade point averages of the two groups. It was, therefore, concluded that the subjects used in the study satisfactorily represented the population originally identified for the study.

Report of the Findings

The responses to the questionnaire items were tabulated and will be reported at this time. In each instance where responses were of an appropriate nature, a chi-square was calculated to determine whether differences between responses of More Satisfied (MS) and Less Satisfied (LS) students were significant. Where computation of a chi-square was not appropriate, a frequency count and percentage distribution was obtained. Percentages have been included in all of the following tables in order to facilitate comparisons between More Satisfied and Less Satisfied students and to provide information regarding the total sample.

APL/360 Computer facilities and programs were utilized to compute the chi-square, *t*-tests and correlations referred to in this chapter. Access to these facilities was secured by utilizing a computer terminal installed in the research room of Erickson Hall at Michigan State University.

Satisfaction Scale Data

As indicated in Chapter III, the questionnaire included certain items that comprised a satisfaction scale. Total satisfaction scores, obtained by simply adding the numerical values of the responses to each question, were used as a basis for differentiating the more satisfied students from those who were less satisfied. After arranging the students on a continuum in terms of their total scores on the questions, a median split was employed to divide the group. Such a technique was utilized because it was considered a more stringent test than such an alternative as comparing the extremes of the continuum. The top half of the group

thus divided shall hereafter be referred to as the More Satisfied and will be designated by the letters MS, while the bottom half of the group will be referred to as the Less Satisfied and will be designated by the letters LS.

Table 4.1 provides a comparison of the responses of the MS and LS students with regards to the items on the Satisfaction Scale. Inspection of this table provides one with a clearer picture of the difference between MS and LS students.

Although 32.5 per cent of the MS students said they never felt "out of place" in engineering, only 5.2 per cent of the LS students made the same statement. The difference between the groups on this item are more graphically shown by the fact that while no MS student said he frequently felt "out of place" in engineering, 33.3 per cent of the LS students indicated such a feeling.

The question of whether they had ever considered changing their major showed that only 10 per cent of the MS students had ever considered it seriously. On the other hand, 56.4 per cent of the LS students had seriously considered such a move.

Sixty per cent of the MS students describe their classroom experience as usually satisfying while 15 per cent state that they were sometimes dissatisfied. In contrast to this only 7.7 per cent of the LS students designated this experience as usually satisfying, with 46.2 per cent stating that it was either sometimes or usually dissatisfying.

The question that examined students' interest in becoming engineers revealed that during their first two years of study, the interest of 100 per cent of the MS students increased somewhat (60.0 per cent) or greatly

TABLE 4.1 Comparison of More Satisfied (MS) and Less Satisfied (LS) students on Satisfaction Scale items

Variable	Responses	% MS	% LS	% Total
1. Have you ever felt "out of place" in Engineering?	a) No, never	13 32.5	2 5.2	15 18.5
	b) Yes, but only occasionally	27 67.5	24 61.5	51 64.5
	c) Yes, frequently	- -	13 33.3	13 16.4
	d) Yes, all of the time	- -	- -	- -
		x^2 = 21.234* df = 2		
2. Have you ever considered changing your present major?	a) No, never	10 25.0	3 7.7	13 16.5
	b) Yes, but not seriously	26 65.0	14 35.9	40 50.6
	c) Yes, seriously	4 10.0	20 51.3	24 30.4
	d) Yes, and I am going to change	- -	2 5.1	2 2.5
		x^2 = 21.993* df = 3		
3. How would you describe your attitude towards your classroom experience during your freshman and sophomore years?	a) Usually satisfied	24 60.0	3 7.7	27 34.2
	b) Sometimes satisfied	10 25.0	18 46.1	28 35.2
	c) Sometimes dissatisfied	6 15.0	16 41.0	24 27.9
	d) Usually dissatisfied	- -	2 5.2	2 2.5
		x^2 = 26.311* df = 3		

TABLE 4.1 CONT.

Variable	Responses	% MS	% LS	% Total
4. How would you describe your interest in becoming an Engineer, over the last two years?	a) Increased greatly	16 40.0	5 12.8	21 26.6
	b) Increased somewhat	24 60.0	19 48.8	43 54.4
	c) Decreased somewhat	- -	14 35.8	14 17.7
	d) Decreased greatly	- -	1 2.6	1 1.3
	x^2 = 21.126* df = 2			
5. Which one of the following best describes your feelings about Engineering as you look forward to the last two years of Engineering courses?	a) Enthusiastic	19 47.5	2 5.1	21 26.6
	b) Hopeful	21 52.5	26 66.7	47 59.5
	c) Hesitant	- -	9 23.1	9 11.4
	d) Discouraged	- -	2 5.1	2 2.5
	x^2 = 25.545* df = 2			
6. How do you feel about the cost (time, effort, worry, money, etc.) of becoming an Engineer?	a) It's definitely worth it.	28 70.0	8 20.5	36 45.6
	b) It's probably worth it.	12 30.0	27 69.3	39 49.3
	c) It's probably <u>not</u> worth it.	- -	4 10.2	4 5.1
	d) It's definitely not worth it.	- -	- -	- -
	x^2 = 20.871* df = 2			

* Significant < .001 level - Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequencies.

(40.0 per cent). Sixty one and six tenths per cent of the LS students expressed similar increases in interest with 38.4 per cent of them indicating that their interest in becoming an engineer had declined.

MS students have even more enthusiastic feelings about engineering as they look forward to their last two years of course work. Hopeful feelings are expressed by 52.5 per cent with 47.5 per cent stating that they are enthusiastic. LS students show a less optimistic view of the future with only 5.1 per cent of them expressing feelings of enthusiasm. Although 66.7 per cent of the LS group indicate some hope for the future, 28.2 per cent express some degree of hesitancy or discouragement.

Question number 6 explored student attitudes towards the cost involved in becoming an engineer. The majority of the MS students (70 per cent) thought that becoming an engineer was definitely worth the cost, with the remaining 30 per cent indicating that it was probably worth it. Again we see that the LS students are not as convinced of the value of becoming an engineer. Although 20.5 per cent state that they think it is definitely worth it and 69.3 per cent state that it is probably worth it, 10.2 per cent felt that it is probably <u>not</u> worth it.

As indicated in the table, chi-square tests of differences between the responses of MS and LS students to each of the items revealed that all 6 chi-squares were significant beyond the .05 level.

In order to facilitate descriptions of the total sample, frequency distributions and percentages for each item were tabulated for combined groups of MS and LS students and included in Table 4.1. These results reveal that although the majority of students view their first two years experience with some degree of satisfaction, there is a considerable group

for which this is not the case. For example, 16.4 per cent of the total group indicated that they had frequently felt "out of place" in engineering, 32.9 per cent had seriously considered changing their major, 30.4 per cent expressed some degree of dissatisfaction, 19 per cent stated their interest had decreased somewhat, 13.9 per cent were hesitant or doubtful about their last two years of engineering courses, and 5.1 per cent felt that becoming an engineer probably wasn't worth the cost.

These questions indicate that there is a great difference in the level of satisfaction between those students in the top half of the group, thus designated and those in the bottom half of the group.

Descriptive Data

Efforts were made to obtain information regarding how each student spent the major portion of his time. It was anticipated that the MS students would be characterized by the greater amount of time they spent meeting the demands of their environment or in this case, the demands of the curriculum.

Items 7 through 15 were directed at gaining information regarding the student's allocation of time and the nature of his social activities. The data from items 7 through 14 were grouped and are expressed in terms of frequencies and percentages for descriptive purposes. *t*-tests rather than chi-square techniques were used to examine differences between MS and LS students, however, in order to make full use of the data obtained.

Item 7 asked students to indicate how often during an average term they had spent most of the weekend in some activity other than study. Table 4.2 provides a comparison between MS and LS students with regard to this variable. No significant difference was found between the two groups.

TABLE 4.2 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to the number of weekends per term in which most of the time was spent in some activity other than study*

Item 7	0	1-3	4-6	7-9	10 <	
More Satisfied	2 5.0	7 17.5	11 27.5	9 22.5	11 27.5	t = 1.298
Less Satisfied	7 18.0	9 23.1	9 23.1	6 15.4	8 20.5	df = 77
Total Sample	9 11.4	16 20.3	20 25.3	15 19.0	19 24.0	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

The table indicates, however, that the 23.5 per cent of the MS students stated that not more than three weekends were spent primarily in study as compared to 41.1 per cent of the LS students. On the other hand, 50.0 per cent of the MS students as compared to 36.0 per cent of the LS students state that they spend 7 or more weekends per term in which most of their time goes for activities other than study.

Examination of the percentage distribution for the entire sample reveals the following; 11.4 per cent report no weekends, 20.3 per cent report 1-3, 25.3 per cent report 4-6, 19.0 per cent report 7-9, and 24.0 per cent report that 10 or more weekends per term are spent primarily in some activity other than studying.

Each student was asked in item 8 to list the number of times they went out on a date during an average term. Table 4.3 reveals that 22.5

TABLE 4.3 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with repsect to the number of dates per term*

Item 8	0	1-4	5-8	9-12	13	
More Satisfied	9 22.5	16 40.0	3 7.5	6 15.0	6 15.0	t = .195
Less Satisfied	4 10.3	19 48.7	8 20.5	7 18.0	1 2.5	df = 77
Total Sample	13 16.5	35 44.3	11 13.9	13 16.5	7 8.9	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

per cent of the MS students did not go out on any dates during the average term. Only 10.3 per cent of the LS students indicated such a lack of dating behavior. Worthy of note is the fact that while more MS students than LS students report a total lack of dates, more of the MS students date with greater frequency than do LS students; 15 per cent of the MS students having 13 or more dates per term as compared to 2.5 per cent of the LS students. The t-test between MS and LS students was not significant, however. As indicated in the table, the sample as a whole did little dating, 16.5 per cent having no dates at all and a total of 60.8 per cent having less than 4 dates.

Item 9 elicited information concerning the heterosexual relationships of the students. The comparison between MS and LS students is shown in Table 4.4. Approximately 40 per cent of both groups reported

TABLE 4.4 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to the number having steady girl friends, being pinned, engaged and married*

Item 9	Yes	No	Engaged	Pinned	Married	
More Satisfied	17 42.5	23 57.5	1 2.5	2 5.0	3 7.5	t = .515
Less Satisfied	15 38.5	24 61.5	3 7.7	3 7.7	3 7.7	df = 77
Total Sample	32 40.5	47 59.5	4 5.1	5 6.3	6 7.6	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

having "steady" girl friends. Of the total group 11.4 per cent reported being engaged or pinned and 7.6 per cent reported being married. No significant difference was found between the More Satisfied and Less Satisfied students.

Item 10 questioned students as to the number of times they went out with the boys during an average week. Table 4.5 permits comparison between More Satisfied and Less Satisfied students with respect to this variable. It is noteworthy that while almost half of both groups report no such activity, 18 per cent of the Less Satisfied students compared to 2.5 per cent of the More Satisfied reported that they went out with the boys twice a week. The difference between More Satisfied and Less Satisfied students did not reach significant levels, however.

In item 11 students were asked how often they particpated in "bull

TABLE 4.5 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to the number of times they went out with the boys during an average week*

Item 10	0	1	2	
More Satisfied	18 45.0	21 52.5	1 2.5	t = -.391
Less Satisfied	19 48.7	13 33.3	7 18.0	df = 77
Total Sample	37 46.8	34 43.0	8 10.1	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

sessions" during an average week. In Table 4.6 a comparison is made between More Satisfied and Less Satisfied students in terms of their responses to this question. As indicated in the table, no significant difference was found.

Item 12 requested each subject to indicate the number of hours he spent in study each week. The data are compared in Table 4.7 and indicate that the More Satisfied students spend more hours in study per week than do the Less Satisfied students. Differences between the two groups were found to be significant beyond the .05 level of probability. Examination of the data concerning the total sample reveals that 27.8 per cent of the students spend only 4 to 16 hours per week in study, while 26.6 per cent of the sampled students reported spending 33 hours or more in study.

TABLE 4.6 Comparison between More Satisfied (MS) and Less Satisfied (LS) students with respect to the number of "bull sessions" participated in during an average week*

Item 11	0	1	2	3	4	
More Satisfied	5 12.5	13 32.5	9 22.5	6 15.0	7 17.5	t = -.515
Less Satisfied	7 17.9	9 23.2	13 33.3	3 7.7	7 17.9	df = 77
Total Sample	12 15.2	22 27.9	22 27.9	9 11.3	14 17.7	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

TABLE 4.7 Comparison between More Satisfied (MS) and Less Satisfied (LS) students with respect to the number of hours spent in study per week

Item 12	4-16	17-24	25-32	33-42	43 <	
More Satisfied	7 17.5	3 7.5	16 40.0	9 22.5	5 12.5	t = 3.006*
Less Satisfied	15 38.5	7 18.0	10 25.6	5 12.8	2 5.1	df = 77
Total Sample	22 27.8	10 12.7	26 32.9	14 17.7	7 8.9	

* Significant < .01 level

Note: In each cell, percentages are shown below corresponding frequencies.

In item 13 students were asked to report the average number of hours they spent in sleep each night. The response of the More Satisfied and Less Satisfied students are comparied in Table 4.8. No significant difference was found between the two groups. Looking at the sample as a whole reveals that 44.3 per cent of the students average 7 hours of sleep, 31.6 per cent average 6 hours or less, and 24.1 per cent average 8 hours or more sleep per night.

TABLE 4.8 Comparison of the amounts of sleep between More Satisfied (MS) and Less Satisfied students*

Item 13	5	6	7	8	9	
More Satisfied	1 2.5	10 25.0	18 45.0	10 25.0	1 2.5	t = 1.279
Less Satisfied	2 5.1	12 30.8	17 43.6	8 20.5	- -	df = 77
Total Sample	3 3.8	22 27.8	35 44.3	18 22.8	1 1.3	

* Not statistically significant
\- Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequencies.

In item 14 an effort was made to obtain information concerning how much time was spent on forms of entertainment beyond that spent dating. Table 4.9 provides a comparison between More Satisfied and Less Satisfied students with regard to this variable. Differences between the two groups did not reach significant levels. Data on the total sample reveal that 48 per cent of the students report that they average less than 1 hour per

TABLE 4.9 Comparison between More Satisfied (MS) and Less Satisfied (LS) students with respect to the amount of time spent on non-dating entertainment*

Item 14	0	1-6	7-12	13-19	20	
More Satisfied	4 10	16 40.0	14 35.0	2 5.0	4 10.0	t = -.463
Less Satisfied	4 10.3	14 35.9	13 33.3	4 10.3	4 10.3	df = 77
Total Sample	8 10.1	30 37.9	27 34.2	6 7.6	8 10.1	

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

day on such forms of entertainment as movies, television, athletics, fraternities, etc. Only 17.7 per cent of the students reported spending over 13 hours per week on such forms of entertainment.

Item 15 was included for the purpose of ascertaining if the students thought there were other ways in which they expended significant amounts of time. Table 4.10 permits a comparison of the More Satisfied and Less Satisfied students with respect to their answers to this question. Sixty eight and four tenths per cent of the total group felt that there were no other ways in which they spent significant amounts of time beyond those already mentioned. Seventeen and seven tenths per cent of the total group did state, however, that they spent significant amounts of time working at some job. Reading and card games accounted for another 13.9 per cent of the students.

TABLE 4.10 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to other ways in which they spent significant amounts of time

Item 15	Working	Reading	Cards	No Others
More Satisfied	8 20.0	4 10.0	2 5.0	26 65.0
Less Satisfied	6 15.4	2 5.1	3 7.7	28 71.7
Total Sample	14 17.7	6 7.6	5 6.3	54 68.4

Note: In each cell, percentages are shown below corresponding frequencies.

Institutional Goals

An effort was made to examine student opinions concerning what educational goals they thought a university should emphasize. Students were asked to indicate whether they thought a selected list of goals were Highly Important, of Some Importance, or of Little Importance. A mean rank was then computed for each of the six goals. Table 4.11 contains the Mean Ranks and Rank Orders for the MS and LS students and the combined groups.

It is readily discerable that students who chose engineering as their college major have a vocational orientation whether they are satisfied with their experience in college or not.

MS and LS students differ with respect to what they see as the second most important goal. Those students who were less satisfied with their experience in college felt that the university should develop your

TABLE 4.11 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with regard to the goals they think should be emphasized by the university

Item 16 Goals	MS	LS	Total Sample
Provide vocational training; develop skills and techniques related to career	1 1.88	1 1.95	1 1.91
Provide you with a basic general education and appreciation of ideas	2 2.64	3 2.76	2 2.69
Develop your ability to get along with different kinds of people	3 3.00	2 2.54	3 2.77
Develop your knowledge and interest in community and world problems	4 3.83	4 3.78	4 3.81
Help develop your moral capacities, ethical standards and values	5 4.65	5 4.76	5 4.70
Prepare you for a happy marriage and family life	6 5.00	6 5.22	6 5.11

Note: In each cell, mean ranks are shown below corresponding rank orders.

ability to get along with other people and that a basic general education and appreciation of ideas was not as important.

The MS students reversed this order of importance, ranking a basic general education as number 2 and ability to get along with different kinds of people as number 3.

Mean rankings for the total group on these two goals provided a rank order that was in agreement with that of the MS students.

The remaining three goals, development of knowledge and interest

in community and world problems, development of moral capacities and ethical standards, and preparation for a happy marriage and family life, received rank orders of 4, 5, and 6, respectively, from both the MS and LS students and the total group as well.

Contributions to Development

In another effort to explore some of the common elements to which all undergraduates are exposed, six of the more salient features were selected and presented in the questionnaire. Students were asked to rate them in the order of the relative contribution each had made to their overall development and preparation for life after graduation.

A mean rating was then computed for each item and rank order profile constructed by listing the six items in order of decreasing size of the mean rating of the total group.

Table 4.12 again reveals the vocational orientation of the students. Technical courses were consistently regarded as contributing the most to the students' overall development. Roommates and friends received the next highest rating of importance. Non-technical courses and personal social activities were rated next in importance with both MS and LS students giving the latter item identical ratings. Athletics and sports and organized extracurricular activities received the lowest ratings from both groups of students.

These findings reinforce the impression one gets from the "goals" questions in Table 4.11 - namely, that for the group as a whole there is a prime concern with vocational preparation, but that interpersonal relationships play an important role in students undergraduate development.

TABLE 4.12 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to contributions to development

Item 17 Contributions	MS	LS	Total Sample
Technical Courses	1 1.37	1 1.87	1 1.62
Roommates and Friends	2 2.58	2 2.30	2 2.44
Non-technical Courses	3 3.05	3 3.13	3 3.09
Personal Social Activities	4 3.15	4 3.15	4 3.15
Athletics and Sports	5 3.51	5 3.82	5 3.66
Organized Extra-curricular Activities	6 4.12	6 4.05	6 4.08

Note: In each cell, mean ratings are shown below corresponding rank orders.

It was of interest to know how enjoyable students found each of these experiences. Therefore, in item 18 students were asked to rate each of these six features of undergraduate life in terms of how enjoyable it was.

As Table 4.13 indicates, both MS and LS students felt that personal social activities were the most enjoyable experiences. Identical ratings were given by both groups to the second most enjoyable aspect of undergraduate life - namely, roommates and friends. The third and fourth

TABLE 4.13 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with respect to contributions to enjoyment

Item 18 Enjoyment	MS	LS	Total Sample
Personal Social Activities	1 1.97	1 1.81	1 1.89
Roommates and Friends	2 2.00	2 2.00	2 2.00
Athletics and Sports	3 2.15	3 2.42	3 2.28
Technical Courses	4 2.55	4 3.05	4 2.80
Organized Social Activities	5 3.02	6 3.41	5 3.21
Non-technical Courses	6 3.52	5 3.38	6 3.45

Note: In each cell, mean ratings are shown below corresponding rank orders.

highest ratings were given to athletics and sports, and technical courses respectively, by both MS and LS students. The only difference between MS and LS students appeared with regard to whether non-technical courses, or organized extracurricular activities should receive the lowest rating. MS students gave non-technical courses the lowest rating, while the LS students thought organized extracurricular activities were the least enjoyable. Mean ratings of the total groups resulted in a rank ordering of the items identical to that of the MS students.

Recommended Changes

A concerted effort was made to examine student opinion concerning what they thought to be the shortcomings of their freshman and sophomore experience. One way in which this information was gathered was to ask each student to agree or disagree with statements of recommended changes within the College of Engineering, on the basis of whether he thought such changes would have made his freshman and sophomore experience more valuable. A comparison of MS and LS student replies to these questions is provided in Table 4.14.

As is shown in this table, only a slim majority of students (54.5 per cent) feel that they wouldn't have benefited if they had been allowed more time for other "intellectual" pursuits. Although a majority of the LS students (53.8 per cent) felt they could have benefited by such experiences, the difference between them and the MS students, 37.5 per cent of whom felt the same way, did not reach the .05 level of significance.

Significant differences were found, however, between MS and LS students on the question of whether or not more personal contacts with other classes would have been valuable. Almost twice as many LS students as MS students, 82.1 per cent compared to 47.5 per cent, felt that such contacts would have been an improvement on their own experiences. The total sample reflected this same opinion with 64.6 per cent of them voicing agreement. Such an attitude being voiced by a majority of students would seem to imply that the curriculum does not now provide for such interaction.

The majority (60.7 per cent) of the students also felt that they would have benefited if their classes had contained fewer lectures and

TABLE 4.14 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with regard to their opinion of what would have made their freshman and sophomore experience more valuable

Would experience have been more valuable if it had:	Group	Strongly Disagree	Disagree	Agree	Strongly Agree	
(19) Allowed more time for other "intellectual" pursuits	MS	2 5.0	23 57.5	12 30.0	3 7.5	x^2 = 3.877
	LS	2 5.1	16 41.0	13 33.3	8 20.5	df = 3
	Total	4 5.1	39 49.4	25 31.6	11 13.9	
(20) Provided more personal contacts with other classes	MS	- -	21 52.5	18 45.0	1 2.5	x^2 = 12.834*
	LS	- -	7 17.9	26 66.7	6 15.4	df = 2
	Total	- -	28 35.4	44 55.7	7 8.9	
(21) Contained fewer lectures, more discussions	MS	- -	19 47.5	16 40.0	5 12.5	x^2 = 6.395
	LS	2 5.1	10 25.6	18 46.2	9 23.1	df = 3
	Total	2 2.5	29 36.7	34 43.0	14 17.7	
(22) Provided more personal contacts with the faculty	MS	- -	8 20.0	24 60.0	8 20.0	x^2 = .936
	LS	- -	5 12.8	24 61.5	10 25.6	df = 2
	Total	- -	13 16.5	48 60.7	18 22.8	

TABLE 4.14 Continued

Would experience have been more valuable if it had:	Group	Strongly Disagree	Disagree	Agree	Strongly Agree	
(23) Allowed more time for social activities	MS	3 7.5	28 70.0	7 17.5	2 5.0	x^2 = 9.906*
	LS	- -	19 48.7	16 41.0	4 10.3	df = 3
	Total	3 3.8	47 59.5	23 29.1	6 7.6	
(24) Given more personal direction in studies and course selection	MS	- -	17 42.5	20 50.0	3 7.5	x^2 = 6.087**
	LS	- -	15 38.5	13 33.3	11 28.2	df = 2
	Total	- -	32 40.5	33 41.8	14 17.7	
(25) Permitted greater freedom in course selection	MS	- -	17 42.5	15 37.5	8 20.0	x^2 = 1.276
	LS	1 2.6	15 38.5	13 33.3	9 23.1	df = 3
	Total	1 1.3	32 40.5	28 35.4	17 21.5	
(26) Allowed more time for extracurricular activities	MS	1 2.5	23 57.5	15 37.5	1 2.5	x^2 = 2.494
	LS	- -	19 48.7	17 43.6	3 7.7	df = 3
	Total	1 1.3	42 53.2	32 40.5	4 5.1	

TABLE 4.14 Continued

Would experience have been more valuable if it had:	Group	Strongly Disagree	Disagree	Agree	Strongly Agree	
(27) Provided more personal contact with classmates	MS	- -	13 32.5	22 55.0	5 12.5	x^2 = .893
	LS	- -	16 41.0	20 51.3	3 7.7	df = 2
	Total	- -	29 36.7	42 53.2	8 10.1	
(28) Provided more emphasis on liberal studies not related to any occupation	MS	7 17.5	24 60.0	7 17.5	2 5.0	x^2 = 9.959*
	LS	3 7.7	14 35.9	19 48.7	3 7.7	df = 3
	Total	10 12.7	38 48.1	26 32.9	5 6.3	
(29) Placed more emphasis on occupational or professional preparation	MS	2 5.0	13 32.5	21 52.5	4 10.0	x^2 = 5.108
	LS	- -	19 48.7	19 48.7	1 2.6	df = 3
	Total	2 2.5	32 40.5	40 50.6	5 6.3	
(30) Allowed more time for activities and social life	MS	3 7.5	22 55.0	14 35.0	1 2.5	x^2 = 3.185
	LS	1 2.6	19 48.7	15 38.5	4 10.2	df = 3
	Total	4 5.1	41 51.9	29 36.7	5 6.3	

TABLE 4.14 Continued

Would experience have been more valuable if it had:	Group	Strongly Disagree	Disagree	Agree	Strongly Agree	
(31) Required more work in courses	MS	7 17.5	28 70.0	5 12.5	- -	x^2 = 2.059
	LS	11 28.2	24 61.5	4 10.3	- -	df = 2
	Total	18 22.8	52 65.8	9 11.4	- -	
(32) Provided greater assistance in choosing a major within engineering	MS	1 2.5	18 45.0	18 45.0	3 7.5	x^2 = 5.188
	LS	- -	12 30.8	18 46.2	9 23.1	df = 3
	Total	1 1.3	30 37.9	36 45.6	12 15.1	
(33) Emphasized theory more than application	MS	12 30.0	26 65.0	2 5.0	- -	x^2 = 1.053
	LS	15 38.5	21 53.9	3 7.7	- -	df = 2
	Total	27 34.2	47 59.5	5 6.3	- -	

* Significant < .01 level
** Significant < .05 level
\- Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequency.

more discussions. Again it was found that the LS students felt more strongly about this than did the MS students, although a majority of both groups were in agreement. The difference between the MS and LS students was not significant, however.

In addition to feeling that they would have benefited from more discussions, the vast majority felt that there should have been more personal contact with the faculty. Eighty seven and one tenth per cent of the LS students and 80.0 per cent of the MS students indicated such a preference. Only 16.5 per cent of the total group expressed the belief that nothing would be gained by such contacts.

The table points out the great difference of opinion that existed between MS and LS students concerning the question of whether they should have been allowed more time for social activities. Seventy seven and five tenths per cent of the MS students felt that sufficient time had been allowed, while 51.3 per cent of the LS students expressed a need for more time. The difference between the groups was found to be significant beyond the .05 level. Considering the group as a whole reveals that 63.3 per cent of them felt that adequate time had been provided for social activities.

A desire for more personal direction in studies and course selection was indicated by 59.5 per cent of the total group of students. Although a majority of both the MS and LS students were in agreement concerning this item, significant differences were found between the two groups.

It is of interest to note that while 57.5 per cent of the MS students felt there should have been more personal direction in course selection, an identical percentage felt they should have had greater

freedom in course selection. LS students also showed a similar pattern, although the percentage desiring greater freedom of selection was slightly lower. Selections of the total group followed the same pattern with 56.9 per cent of them stating that they preferred more personal direction in their course selection.

At first glance these two items appear to be mutually exculsive. The distribution can be explained, however, if student response to the question concerning more personal direction is viewed as a desire for more "personalized" interaction. Such an interpretation would be in agreement with student responses to those questions that concerned more personal contacts with other classes and faculty and more class discussions.

The response to item 25 could then be taken at face value, namely, a desire for greater freedom in course selection.

Item 26 posed the question of whether having more time for extracurricular activities would have been valuable. The majority of the total group felt that their experience would not have been more valuable if such time had been available. LS students more often than MS students indicated that additional time would have been valuable, but differences between the groups did not reach significant levels.

A majority of students, however, did think that an increase in student interaction would have brought a corresponding increase in the value of their experience. It is interesting to note that the MS students felt more strongly about the importance of this interaction than did LS students. This appears to be as much an increased valuation of the importance of student interaction on the part of the MS students as it is a

reflection of a lower level of interest on the part of LS students for any more interaction with other engineering students than they already have. This explanation is supported by the fact that although the majority of MS students did not support the previous questions concerning increased student contact, 80 per cent of them are in favor of increased contact with other engineering students. On the other hand, over 80 per cent of the LS students had been in favor of increased contacts with other classes but that percentage falls to 59 per cent when the increased contacts are limited to other engineering students.

The apparent interest of the LS students in ideas and people outside of engineering is also evident in the answers to item 28. The table shows that 56.4 per cent of the LS students felt that they would have benefited from an increased emphasis on liberal studies not related to any occupation. Only 23.5 per cent of the MS students thought that such an experience would have been more valuable than what they had. This difference between the MS and LS students was found to be significant beyond the .05 level. In spite of this difference, however, 60,8 per cent of the total group felt that nothing would be gained by such a change in emphasis.

Item 29 questioned whether more emphasis should have been placed on occupational or professional preparation. Although the majority of students felt that the increased emphasis would have been valuable, the MS students were considerably more enthusiastic than the LS students. Differences between the groups, though not reaching significant levels, did provide further indication of a basic difference between the two groups.

In a further effort to explore this difference, an item (30) was included that was a combination of two items (23 and 26) that appeared

earlier in the questionnaire. Responses to this question revealed that the MS students react less negatively to the idea of more social life when it is used in its broadest sense. LS students who had been equally divided on the previous two questions, again responded in the same manner, indicating that they saw social activities and other "extracurricular" activities as equally desirable.

One of the few items on which both MS and LS students were in close agreement was item 31. This item raised a question concerning the value of increasing the amount of required work in each course. Only 11.4 per cent of the students felt that their experience would have been more valuable if more work had been required of them. Of those who disagreed with this suggestion, over a third of them felt strongly that it would not have added to the value of their experience.

Because the different areas within the field of engineering offer such a wide range of experiences, it was thought that student satisfaction might be related to whether the student feels he has made the correct choice. In order to explore this possibility, item 32 was included in the questionnaire. This item asked students if they thought they might have benefited if the college had provided greater assistance to them in choosing a major within the field of engineering. The majority of the students sampled felt that more help would have been valuable. As the table shows, 69.3 per cent of the LS students as compared to 52.5 per cent of the MS students answered the question in the affirmative. The differences between the MS and LS students approached but did not reach significance.

The final item in this section of the questionnaire explored student

feelings concerning a theoretical versus an applied curriculum. As the table reveals, 93.7 per cent of all the students felt that their curriculum should not have emphasized theory more than application. On no other item in this section of the questionnaire was their such a consensus of opinion. As expected, there was no significant difference between MS and LS students in terms of the way they answered this question.

Expectancies and Experiences

The final section of the questionnaire was included in order to explore the nature of student expectations and the extent to which they are realized. It was believed that student satisfaction might well be related to the extent to which college experiences meet or exceed expectations. The following analysis explores differences between the MS and LS students regarding what expectations they held concerning their curriculum and performance during the first two years.

Table 4.15 presents the data concerning the expected and actual technical achievement of the students questioned. As is shown in the table, the majority of both the MS and LS students expected above average achievement in technical courses. It also shows that only slightly more than half of those students actually achieved at that level. It is noteworthy that virtually none of the students expected to achieve at below average levels and for the most part, none did. Of course, those students who failed to meet at least average levels of attainment would not be encouraged to continue in the college. The table is, therefore, representative only of those students who achieve at average or better levels in technical courses and who remain in engineering. No significant

TABLE 4.15 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual technical achievement*

		Below Average	Average	Above Average	
(34) Expected Technical Achievement	MS	1 2.6	8 20.5	30 76.9	$x^2 = 1.964$
	LS	- -	12 30.8	27 69.2	df = 2
(35) Actual Technical Achievement	MS	1 2.6	19 50.0	18 47.3	$x^2 = .218$
	LS	1 2.6	21 55.3	16 42.1	df = 2

* Not statistically significant
\- Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequencies.

differences were found between MS and LS students with respect to expected or actual achievement in technical courses.

Students were also asked to indicate the level of achievement they expected and actually attained in non-technical courses. The answers to these questions were tabulated and are contained in Table 4.16. Although both the MS and LS students had lower expectations of their non-technical achievement than of their technical achievement, the difference between the two groups was found to be significant at the .05 level. Those students who comprised the MS group had a wider range of expected achievement than did the LS students with 55.0 per cent of them expecting above

TABLE 4.16 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual non-technical achievement

		Below Average	Average	Above Average	
(36) Expected Non-technical Achievement	MS	3 7.5	15 37.5	22 55.0	$x^2 = 6.988$*
	LS	- -	22 56.4	17 43.6	df = 2
(37) Actual Non-technical Achievement	MS	2 5.0	21 52.5	17 42.5	$x^2 = 2.085$
	LS	3 7.7	15 38.5	21 53.8	df = 2

* Significant $<$ .05 level
\- Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequencies.

average achievement. By way of contrast, none of the LS students expected below average achievement and 56.4 per cent of them expected to do no better than average. The table further reveals that the MS students did less well than they had expected. Although the LS students did better than expected as a whole, a few achieved at below average levels. Differences in non-technical achievement between the MS and LS students did not reach significant levels, however.

It was believed the shifting emphasis in engineering education from applied to theoretical studies might have a significant impact on student satisfaction if students were unware of this change. Students were,

therefore, asked to indicate what they expected regarding the theoretical nature of their curriculum. Table 4.17 reveals that the majority of both

TABLE 4.17 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual theoretical nature of curriculum*

		>Half	About Half	<Half	
(42) Expected Theory Content	MS	17 42.5	13 32.5	10 25.0	x^2 = .325
	LS	13 38.2	13 38.2	8 23.5	df = 2
(43) Actual Theory Content	MS	8 20.0	13 32.5	19 42.5	x^2 = .556
	LS	5 13.8	13 36.1	18 50.0	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

the MS and LS students expected that theoretical material would not constitute more than half of the curriculum. Both groups relate that half or more of the material actually was theoretical in nature, however. Some indication of how students felt about this unexpected emphasis on theoretical material is gained by a re-examination of student response to item 33 in Table 4.14. In this item students were asked if they thought their freshman and sophomore experience would have been more valuable if it had emphasized theory more than application. The table shows that 93.7 per

cent of the total group did not think it would have been more valuable. When one considers that over 80 per cent of the students stated that the curriculum actually did emphasize theory more than application, it seems reasonable to interpret student response to item 33 as one of dissatisfaction with the amount of theoretical material in the curriculum. No significant differences were found between the MS and LS students on any of these questions.

Two other questions related to the curriculum were those that concerned expected and actual opportunities to apply their knowledge. Table 4.18 contains the data from these two questions. It shows that MS and LS

TABLE 4.18 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual application of knowledge*

		Few	Some	Many	
(44) Expected Application of Knowledge	MS	9 22.5	14 35.0	17 42.0	x^2 = .174
	LS	9 25.0	11 30.5	16 44.4	df = 2
(45) Actual Application of Knowledge	MS	20 54.0	8 21.6	9 24.3	x^2 = 1.958
	LS	23 62.2	9 24.3	5 13.5	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

students had common expectations regarding how many opportunities they thought they would have. A common pattern is also present when they report their actual experiences. Both groups support having fewer opportunities to apply their knowledge than they expected to have. Again there were no significant differences between the MS and LS students.

It was also of interest to examine students' expected and actual feelings of competency in engineering. Table 4.19 shows that the majority of both the MS and LS students expected to feel above average in competence. Although the MS students did not feel quite as competent as they expected, the table shows that they felt significantly more competent than did the LS students. Only 5.6 per cent of the LS students had above

TABLE 4.19 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual feelings of competency

		Below Average	Average	Above Average	
(46) Expected Feelings of Competency	MS	5 12.5	12 30.0	23 57.5	x^2 = .784
	LS	5 13.9	13 36.1	18 50.0	df = 2
(47) Actual Feelings of Competency	MS	5 12.5	21 52.5	14 35.0	x^2 = 12.916*
	LS	15 41.7	19 52.8	2 5.6	df = 2

* Significant $<$.01 level

Note: In each cell, percentages are shown below corresponding frequencies.

average feelings of competency, whereas 41.7 per cent of them expressed feelings judged to be below average. Of the MS students, however, only 12.5 per cent expressed below average feelings of competency, while 35 per cent of their statements were judged to be above average in feelings of competency.

Other items related to this area concerned the expected and actual amounts of study that would be required to earn at least "C" grades in all courses. Table 4.20 shows that there were significant differences between MS and LS students regarding their levels of expectation. The Less Satisfied students expected that less would be required than did the More Satisfied students. No differences were noted between the groups, however,

TABLE 4.20 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual study required

		Not Much	Fair Amount	Quite A Lot	
(38) Expected Study Required	MS	12 30.0	21 52.5	7 17.5	$x^2 = 4.683$*
	LS	21 53.8	14 35.9	4 10.2	df = 2
(39) Actual Study Required	MS	15 38.5	18 46.1	6 15.4	$x^2 = 1.427$
	LS	16 42.1	13 34.2	9 23.6	df = 2

* Significant $<.10$ level

Note: In each cell, percentages are shown below corresponding frequencies.

with regards to the actual amount of study required. The MS students did find that a little less was required than they expected, while the LS students found that a little more was required than was expected.

In addition to exploring students' expectations and experiences regarding topics related to curriculum, certain questions were asked that concerned the areas of social interaction and other matters related to the developmental needs of college students.

A comparison of MS and LS students in terms of their expected and actual participation in social groups during their freshman and sophomore years is given in Table 4.21. It reveals that the level of expectation for the LS students was not significantly different from that of the MS

TABLE 4.21 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual participation in social groups*

		Below Average	Average	Above Average	
(40) Expected Social Life	MS	16 41.0	13 33.3	10 25.6	x^2 = .284
	LS	18 46.2	11 28.2	10 25.6	df = 2
(41) Actual Social Life	MS	9 23.1	10 25.6	20 51.3	x^2 = 1.057
	LS	12 31.6	10 26.3	16 42.1	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

students. No difference was noted between the two groups with regards to their actual experience, either. Both groups did report more participation than expected, however.

An effort was also made to determine how competent students felt in social situations. Item 48 requested information regarding the kind of feelings of social "know-how" they expected to have and item 49 asked them to relate the feelings they actually had. Table 4.22 shows that there were no differences between MS and LS students on these two questions.

Students were also asked to comment on the opportunities for forming heterosexual relationships that they expected to find and those that

TABLE 4.22 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual social "know-how"*

		Below Average	Average	Above Average	
(48) Expected Social "Know-how"	MS	12 31.5	17 44.7	9 23.7	x^2 = .032
	LS	11 28.9	17 44.7	9 23.7	df = 2
(49) Actual Social "Know-how"	MS	8 21.6	14 37.8	15 40.5	x^2 = 1.348
	LS	10 27.7	16 44.4	10 27.7	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

they actually found. Table 4.23 contains the data from the replies to these questions. As the table shows, 80 per cent of the MS and 69.2 per cent of the LS students expected to find many opportunities, but only 37.5 per cent and 35.9 per cent of the MS and LS students respectively, report actually having many opportunities. No significant differences were noted between the MS and LS students with regard to either their expectations of or actual opportunities for forming such relationships.

TABLE 4.23 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual boy-girl relationships*

		Few	Average	Many	
(50) Expected Boy-Girl Relationships	MS	3 7.5	5 12.5	32 80.0	$x^2 = 1.408$
	LS	3 7.7	9 23.0	27 69.2	df = 2
(51) Actual Boy-Girl Relationships	MS	16 40.0	9 22.5	15 37.5	$x^2 = 1.873$
	LS	11 28.2	14 35.9	14 35.9	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

Table 4.24 provides a comparison of MS and LS students regarding their expected and actual opportunities to "live-it-up." It shows that 55.0 per cent of the MS and 63.2 per cent of the LS students expected many such opportunities. It is also noteworthy that the MS students

TABLE 4.24 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding opportunities to "live-it-up"*

		Few	Average	Many	
(58) Expected Chances to "Live-it-up"	MS	9 22.5	9 22.5	22 55.0	$x^2 = 3.153$
	LS	3 7.9	11 28.9	24 63.2	df = 2
(59) Actual Chances to "Live-it-up"	MS	6 15.0	9 22.5	25 62.5	$x^2 = 2.970$
	LS	11 28.9	10 26.3	17 47.2	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

report actually having more opportunities to "live-it-up" than they expected, whereas the LS students report having fewer such opportunities. Of the 28.9 per cent of LS students who report having few opportunities to "live-it-up," only 7.9 per cent of them had so few opportunities. Here again, differences between the MS and LS students did not reach significant levels.

In another effort to gain information regarding student concerns during this developmental period, students were asked what opportunities to work and gain economic independence they expected to have. The largest group of the MS students said that they expected few such opportunities. By way of contrast, the largest group of the LS students indicated that

they expected many opportunities. It is also interesting to note that the MS students report that they found more opportunities than they expected, while the opposite is true of the LS students. Differences between the two groups approached but did not reach significance at the .10 level, as shown in Table 4.25.

TABLE 4.25 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual opportunities to work and gain economic independence*

		Few	Some	Many	
(52) Expected Work and Independence	MS	17 44.7	6 15.8	15 39.5	$x^2 = 3.133$
	LS	10 26.3	6 15.8	22 57.9	df = 2
(53) Actual Work and Independence	MS	10 25.0	9 22.5	21 52.5	$x^2 = 4.066$
	LS	18 46.2	7 17.9	14 35.9	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

Students were also questioned as to the amount of freedom from parental control they expected to have while in college. As shown in Table 4.26 the vast majority of students expected nearly complete freedom. It is interesting that with this very high level of expectancy that the actual experiences of the students actually exceeded what they

TABLE 4.26 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual freedom from parental control*

		Very Little	Average	Nearly Total	
(54) Expected Freedom	MS	3 7.5	1 2.5	36 90.0	$x^2 = 1.148$
	LS	3 7.7	3 7.7	33 84.6	df = 2
(55) Actual Freedom	MS	1 2.5	1 2.5	38 95.0	$x^2 = .000$
	LS	1 2.6	1 2.6	37 94.8	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

expected. As the table indicates, 95.0 per cent of the total group experienced nearly complete independence from parental control during their first two years of college. There were, of course, no significant differences between the MS and LS students on these items.

In addition to those items that made indirect inquiry as to the level of maturity of the students, an item was included that directly asked the student what kind of feelings about being "grown-up" and mature he expected to have as an undergraduate. Table 4.27 reveals that the majority of both MS and LS students expected to feel quite "grown-up" and mature. It is of considerable interest that while the expectancies of

TABLE 4.27 Comparison of More Satisfied (MS) and Less Satisfied (LS) students regarding expected and actual feelings of maturity

		Below Average	Average	Above Average	
(56) Expected Maturity	MS	6 15.4	11 28.2	22 56.4	$x^2 = 3.881$
	LS	2 5.6	12 33.3	22 61.1	df = 2
(57) Actual Maturity	MS	2 5.2	7 17.9	30 76.9	$x^2 = 7.096$*
	LS	8 22.2	8 22.2	20 55.6	df = 2

* Significant $<$.05 level

Note: In each cell, percentages are shown below corresponding frequencies.

the LS students were slightly higher than those of the MS students, the feelings that they report they actually had were considerably lower. As the table shows, the MS students had significantly higher feelings of being "grown-up" and mature than did the LS students.

A further analysis of the data from items 34 through 59 was undertaken in order to determine how accurate the expectations of the students were regarding the experiences they would have as undergraduates. An explanation of this analysis follows.

Although Table 4.15 revealed that the MS and LS students had similar expectations and actual achievement in technical courses, an examination of Table 4.28 reveals that for both of these groups, the actual level of

TABLE 4.28 Comparison of expected and actual technical achievement of More Satisfied (MS) and Less Satisfied (LS) students

		Below Average	Average	Above Average	
(MS) Technical Achievement	(34) Expected	1 2.6	8 20.5	30 76.9	x^2 = 7.588*
	(35) Actual	1 2.6	19 50.0	18 47.3	df = 2
(LS) Technical Achievement	(34) Expected	- -	12 30.8	27 69.2	x^2 = 6.189*
	(35) Actual	1 2.6	21 55.3	16 42.1	df = 2

* Significant $<$.05 level

Note: In each cell, percentages are shown below corresponding frequencies.

achievement in their technical courses was significantly lower than they had expected. In as much as technical courses make up the bulk of an engineering student's course work, it seems reasonable to answer that for many students this comes as something of a disappointment.

Earlier we found that a significant difference existed between the MS and LS students with regard to their expectations of achievement in non-technical courses. A re-examination of Table 4.16 reveals that although the MS students expected to achieve at a significantly higher level, there were no differences between the groups in actual achievement in those courses. An inspection of Table 4.29, however, reveals that the

TABLE 4.29 Comparison of expected and actual non-technical achievement of More Satisfied (MS) and Less Satisfied (LS) students

		Below Average	Average	Above Average	
(MS) Non-technical Achievement	(36) Expected	3 7.5	15 37.5	22 68.1	$x^2 = 1.841$
	(37) Actual	2 5.0	21 52.5	17 42.5	df = 2
(LS) Non-technical Achievement	(36) Expected	- -	22 56.4	17 43.6	$x^2 = 4.748$*
	(37) Actual	3 7.7	15 38.5	21 53.8	df = 2

* Significant $<$.10 level
\- Represents zero frequency

Note: In each cell, percentages are shown below corresponding frequencies.

level of expectation among the MS students, though found to be significantly different from that of the LS students, was none the less the more accurate of the two. The LS students were found to have done both better and worse than expected with the difference between their expectations and actual achievement being significant at the .10 level.

A comparison of differences between what students expected and what they actually found regarding the theoretical nature of the curriculum is found in Table 4.30. It shows that both the MS and LS students expected significantly less theoretical material than they actually found. For both groups, differences were significant at the .05 level.

TABLE 4.30 Comparison of expected and actual theoretical nature of curriculum for More Satisfied (MS) and Less Satisfied (LS) students

		>Half	About Half	<Half	
(MS) Theoretical Nature of Curriculum	(42) Expected	17 42.5	13 32.5	10 25.0	$x^2 = 6.032$*
	(43) Actual	8 20.0	13 32.5	19 47.5	df = 2
(LS) Theoretical Nature of Curriculum	(42) Expected	13 38.2	13 38.2	8 23.5	$x^2 = 7.275$*
	(43) Actual	5 13.8	13 36.1	18 50.0	df = 2

* Significant <.05 level

Note: In each cell, percentages are shown below corresponding frequencies.

Comparisons were also made of the expected and actual opportunities that students found to apply their knowledge. As is shown in Table 4.31 both the MS and the LS students reported having fewer opportunities for such application than was expected. Differences for the MS students were significant at the .05 level. Differences between expected and actual opportunities were even greater for the LS students and were found to be significant at the .01 level.

The earlier comparison of MS and LS students concerning their expected and actual feelings of competency showed that the LS students actually felt significantly less competent than the MS students.

TABLE 4.31 Comparison of expected and actual opportunities to apply knowledge for More Satisfied (MS) and Less Satisfied (LS) students

		Few	Some	Many	
(MS) Opportunities To Apply Knowledge	(44) Expected	9 22.5	14 35.0	17 42.0	x^2 = 8.258*
	(45) Actual	20 54.0	8 21.6	9 24.3	df = 2
(LS) Opportunities To Apply Knowledge	(44) Expected	9 25.0	11 30.5	16 44.4	x^2 = 12.073**
	(45) Actual	23 62.2	9 24.3	5 13.5	df = 2

* Significant $<$ .05 level
** Significant $<$ .01 level

Note: In each cell, percentages are shown below corresponding frequencies.

A further examination of this data is contained in Table 4.32 and shows that both the MS and LS students actually felt significantly less competent than they expected to feel.

The differences for the LS students were significant at the .001 level as compared with a significance level of .10 for the differences of the MS students.

Table 4.33 provides a comparison between expected and actual amounts of study required to earn a "C" in all courses for both the MS and LS students. It reveals that both groups of students have quite accurate conceptions of how much study would actually be required. A re-examination of Table 4.20, however, shows that there was a significant difference

TABLE 4.32 Comparison of expected and actual feelings of competency for More Satisfied (MS) and Less Satisfied (LS) students

		Below Average	Average	Above Average	
MS Feelings of Competencies	(46) Expected	5 12.5	12 30.0	23 57.5	$x^2 = 4.644$*
	(47) Actual	5 12.5	21 52.5	14 35.0	df = 2
LS Feelings of Competencies	(46) Expected	5 13.9	13 36.1	18 50.0	$x^2 = 18.933$**
	(47) Actual	15 41.7	19 52.7	2 5.5	df = 2

* Significant $<$ .10 level
** Significant $<$ .001 level

Note: In each cell, percentages are shown below corresponding frequencies.

TABLE 4.33 Comparison of expected and actual required study for More Satisfied (MS) and Less Satisfied (LS) students*

		Not Much	A Fair Amount	Quite A Lot	
MS Required Study	(38) Expected	12 30.0	21 52.5	7 17.5	$x^2 = .842$
	(39) Actual	15 38.5	18 46.1	6 15.4	df = 2
LS Required Study	(38) Expected	21 53.8	14 35.9	4 10.2	$x^2 = 2.348$
	(39) Actual	16 42.1	13 34.2	9 23.6	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

between the MS and LS students in terms of how much study they expected would be required.

These findings would seem to be in conflict. Further examination of Table 4.20 provides an explanation, however. As the table shows, the MS students found that slightly less study was actually required than expected and the LS students found that slightly more study than expected was required. The result was that differences between the MS and LS students regarding the actual study that they report was required to earn a "C", were not significant.

Further analysis of the data from those items concerning social interaction also resulted in some noteworthy findings. For example, no significant differences were found between the MS and LS students concerning the questions of expected and actual opportunities for participation in social groups. An examination, however, of differences between expected and actual opportunities for the two groups as shown in Table 4.34 revealed that the MS students found significantly more opportunities for such participation than they expected. Differences between expected and actual opportunities for the LS students did not reach significant levels.

An analysis of differences between expected and actual feelings of social "know-how" for both groups of students is presented in Table 4.35. Again the MS students report that their actual feelings concerning their social competence were better than expected. Differences were significant at the .01 level. No significant differences between expected and actual feelings were reported by the LS students, however.

An earlier comparison of MS and LS students regarding their expected and actual opportunities for heterosexual relationships revealed no

TABLE 4.34 Comparison of expected and actual participation in social groups for More Satisfied (MS) and Less Satisfied (LS) students

		Below Average	Average	Above Average	
MS Participation in Social Groups	(40) Expected	16 41.0	13 33.3	10 25.6	$x^2 = 5.685$*
	(41) Actual	9 23.1	10 58.9	20 51.2	df = 2
LS Participation in Social Groups	(40) Expected	18 46.1	11 28.2	10 25.2	$x^2 = 2.609$
	(41) Actual	12 31.6	10 26.3	16 42.1	df = 2

* Significant $<$ .10 level

Note: In each cell, percentages are shown below corresponding frequencies.

TABLE 4.35 Comparison of expected and actual feelings of social "know-how" for More Satisfied (MS) and Less Satisfied (LS) students

		Below Average	Average	Above Average	
MS Feelings of Social "Know-how"	(48) Expected	12 31.5	17 44.7	9 23.7	$x^2 = 10.957$*
	(49) Actual	8 21.6	14 37.8	15 40.5	df = 2
LS Feelings of Social "Know-how"	(48) Expected	11 28.9	17 44.7	9 23.6	$x^2 = .127$
	(49) Actual	10 27.7	16 44.4	10 27.7	df = 2

* Significant $<$ .01 level

Note: In each cell, percentages are shown below corresponding frequencies.

significant differences between the two groups on either of the two variables. Table 4.36 contains the comparison of expected and actual opportunities for such relationships for both the MS and LS students. It reveals that both groups found significantly fewer opportunities for heterosexual relationships than they had expected. Differences for the MS students were found to be significant at the .001 level, while differences for the LS students reached the .01 level of significance.

TABLE 4.36 Comparison of expected and actual opportunities for boy-girl relationships for More Satisfied (MS) and Less Satisfied (LS) students

		Few	Average	Many	
(MS) Opportunities for Boy-Girl Relationships	(50) Expected	3 7.5	5 12.5	32 80.0	x^2 = 25.246*
	(51) Actual	16 40.0	9 22.5	15 37.5	df = 2
(LS) Opportunities for Boy-Girl Relationships	(50) Expected	3 7.7	9 23.0	27 69.2	x^2 = 9.780**
	(51) Actual	11 28.2	14 35.9	14 35.9	df = 2

* Significant $<$.001 level
** Significant $<$.01 level

Note: In each cell, percentages are shown below corresponding frequencies.

Comparisons of expected and actual opportunities to "live-it-up" appear in Table 4.37. It shows that the LS students found approximately what they expected to find. The LS students, however, report having significantly fewer opportunities than they expected to have. Differences were significant at the .10 level.

TABLE 4.37 Comparison of expected and actual opportunities to "live-it-up" for More Satisfied (MS) and Less Satisfied (LS) students

		Few	Average	Many	
(MS) Opportunities to "Live-it-Up"	(58) Expected	9 22.5	9 22.5	22 55.0	x^2 = .792
	(59) Actual	6 15.0	9 22.5	25 62.5	df = 2
(LS) Opportunities to "Live-it-Up"	(58) Expected	3 7.9	11 28.9	24 63.2	x^2 = 5.814*
	(59) Actual	11 28.9	10 26.3	17 44.7	df = 2

* Significant $<$.10 level

Note: In each cell, percentages are shown below corresponding frequencies.

Student responses to questions concerning the expected and actual opportunities to work and gain economic independence were reported previously in Table 4.25. Differences in reported opportunities between MS and LS students were marked and approached, but did not reach significance at the .10 level. The differences between expected and actual opportunities for working and gaining economic independence are given in Table 4.38.

TABLE 4.38 Comparison of expected and actual opportunities for economic independence for More Satisfied (MS) and Less Satisfied (LS) students*

		Few	Some	Many	
(MS) Opportunities for Economic Independence	(52) Expected	17 44.7	6 15.8	15 39.5	$x^2 = 3.379$
	(53) Actual	10 25.0	9 22.5	21 52.5	df = 2
(LS) Opportunities for Economic Independence	(52) Expected	10 26.3	6 15.8	22 57.9	$x^2 = 4.222$
	(53) Actual	18 46.1	7 17.9	14 35.9	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

Here smaller differences are noted. The MS students expected fewer opportunities to work than they actually found, but the difference was not significant. The LS students, however, expected more opportunities than they found. The difference between expected and actual opportunities for the LS students approached, but did not reach significance at the .10 level.

The great degree of agreement between MS and LS students concerning both the expected and actual freedom from parental control was noted in Table 4.26. It was, therefore, no surprise that Table 4.39 revealed no significant differences between expected and actual freedom as reported by both groups of students.

TABLE 4.39 Comparison of expected and actual freedom from parental control for More Satisfied (MS) and Less Satisfied (LS) students*

		Very Little	Average	Nearly Total	
(MS) Freedom From Parents	(54) Expected	3 7.5	1 2.5	36 90.0	$x^2 = 1.054$
	(55) Actual	1 2.5	1 2.5	38 95.0	df = 2
(LS) Freedom From Parents	(54) Expected	3 7.7	3 7.7	33 84.6	$x^2 = 2.228$
	(55) Actual	1 2.6	1 2.6	37 94.9	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

Comparisons between expected and actual feelings of maturity for the MS and LS students are given in Table 4.40. Differences between expected and actual feelings of maturity for both groups approached but did not reach significance.

An additional analysis of the data was undertaken in order to determine whether significant differences existed between the MS and LS students regarding the discrepancy between their level of expectation and their actual experience. Table 4.41 contains these data. The table reveals that the two groups differ significantly in terms of the discrepancy between their expectations and actual experiences on the following variables: opportunities for social life; feelings of competency;

opportunities to work and gain economic independence; feelings of maturity; and chances to live-it-up.

In each of these comparisons in which a significant difference was found between the MS and LS students, it can be observed that the MS students more often reported having better experiences than anticipated, than did the LS students.

TABLE 4.40 Comparison of expected and actual feelings of maturity for More Satisfied (MS) and Less Satisfied (LS) students*

		Below Average	Average	Above Average	
(MS) Feelings of Maturity	(56) Expected	6 15.3	11 28.2	22 56.4	$x^2 = 4.118$
	(57) Actual	2 5.1	7 17.9	30 76.9	df = 2
(LS) Feelings of Maturity	(56) Expected	2 5.5	12 33.3	22 61.1	$x^2 = 4.496$
	(57) Actual	8 22.2	8 22.2	20 55.5	df = 2

* Not statistically significant

Note: In each cell, percentages are shown below corresponding frequencies.

TABLE 4.41 Comparison of More Satisfied (MS) and Less Satisfied (LS) students as to the discrepancy between their expectations and actual experiences*

		Less than Expected	As Expected	More than Expected	
Technical Achievement	MS	17 43.6	17 43.6	5 12.8	x^2 = .392
	LS	18 46.1	14 35.9	7 18.0	df = 2
Non-technical Achievement	MS	7 17.5	27 67.5	6 15.0	x^2 = .916
	LS	7 17.9	23 58.9	9 23.2	df = 2
Required Study	MS	13 32.5	18 45.0	9 22.5	x^2 = 1.241
	LS	12 31.6	13 34.2	13 34.2	df = 2
Social Life	MS	9 23.1	11 28.2	39 48.7	x^2 = 4.767*
	LS	7 18.9	16 43.2	14 37.8	df = 2
Theory Content	MS	8 20.0	14 35.0	18 45.0	x^2 = .540
	LS	5 13.9	13 36.1	18 50.0	df = 2
Application of Knowledge	MS	17 43.6	16 41.0	6 15.4	x^2 = .461
	LS	16 42.1	17 44.7	4 10.5	df = 2

TABLE 4.41 Continued

		Less than Expected	As Expected	More than Expected	
Feelings of Competency	MS	19 47.5	9 22.5	12 30.0	x^2 = 5.507*
	LS	20 55.5	15 42.9	4 11.1	df = 2
Feelings of Social "know-how"	MS	7 18.9	18 48.6	12 32.4	x^2 = .505
	LS	8 22.2	19 52.8	9 25.0	df = 2
Boy-Girl Relationships	MS	24 61.5	13 33.3	2 5.1	x^2 = 1.386
	LS	19 48.7	18 46.2	2 5.1	df = 2
Work and Independence	MS	9 23.1	16 41.0	14 35.9	x^2 = 11.956**
	LS	12 31.6	23 60.5	3 7.9	df = 2
Freedom from Parents	MS	3 7.5	30 75.0	7 17.5	x^2 = .457
	LS	4 10.3	30 76.9	5 12.8	df = 2
Feelings of Maturity	MS	8 20.0	17 42.5	15 37.5	x^2 = 5.254*
	LS	13 37.1	15 42.9	7 20.0	df = 2

TABLE 4.41 Continued

		Less than Expected	As Expected	More than Expected	
Chances to "Live-it-up"	MS	8 20.5	20 51.3	11 28.2	$x^2 = 4.764$*
	LS	16 42.1	15 39.5	7 18.4	df = 2

* Significant <.10 level
** Significant <.01 level

Note: In each cell, percentages are shown below corresponding frequencies.

Supplementary Data

In addition to that information gathered in the questionnaire, additional data was obtained on each student concerning their ability and academic achievement. This data was necessary in order to provide a more complete description of differences between More Satisfied and Less Satisfied students. It was also necessary in order to test several of the research hypotheses posed in the study.

Table 4.42 compares the MS and LS students with regards to their ability as measured by the College Qualifications Test, and their academic achievement as indicated by the students' accumulated grade point averages.

It can be noted that the LS students had somewhat higher mean scores on the verbal tests than did the MS students. Somewhat higher mean scores were obtained by the MS students on the numerical tests, however. Measures of total ability did not differ for the two groups.

TABLE 4.42 Comparison of More Satisfied (MS) and Less Satisfied (LS) students on the basis of the College Qualifications Test (CQT) scores and accumulative grade point averages (GPA)

Variables	Mean Score MS	Mean Score LS	*t*-test	df
CQT Verbal	43.51	48.63	-0.824	77
CQT Numerical	78.56	71.69	1.756	77
CQT Total	63.69	63.67	.005	77
G.P.A.	2.68	2.56	1.041	77

p.10 = 1.670

The table also shows that the MS students had somewhat higher grade point averages than did the LS students. Although no differences significant at the .05 level were found between the two groups on any of the variables, the difference between the two groups in numerical ability was found to be significant at the .10 level.

In a further effort to obtain the greatest possible amount of information from the data obtained on each of the subjects, simple correlations were obtained between measures of the students' satisfaction; verbal, numerical, and total ability; and academic achievement; and the data obtained from those items that asked students to designate how they spent their time. These correlation coefficients are shown in Table 4.43.

The number of hours a student studies is seen to be related to satisfaction and at the .01 level. The table also reveals a significant relationship between a student's numerical ability and the number of

TABLE 4.43 Simple correlations between measures of ability, academic achievement, and activities related to how students allocate their time

	Satis-faction	Entertain-ment	Hours Sleep	Hours Study	Bull Sessions	Out with Boys	Steady Girls	Dates	No Study Weekends	GPA	Total Ability	Numerical Ability
Verbal Ability	-.14	-.13	-.02	-.10	-.05	.02	.11	.08	.12	.27*	.88***	.33**
Numerical Ability	.19	.08	.00	.01	.15	.08	.04	-.02	.23*	.31**	.53***	
Total Ability	.01	-.12	-.02	-.04	-.13	.01	.11	-.01	.16	.34**		
GPA	.18	.04	-.03	.18	-.16	.07	-.13	.00	.13			
No Study Weekends	.13	-.05	.07	-.43***	.18	.15	.06	.31**				
Dates	-.04	.07	.17	-.15	.23*	-.02	.29**					
Steady Girl	-.08	-.14	.00	.00	-.12	-.31**						
Go Out With Boys	.11	.06	.01	-.11	.11							
Bull Sessions	-.13	.05	-.02	-.14								
Hours Study	.28**	-.17	-.05									
Hours Sleep	.15	.10										
Entertain-ment	.03											

p.10 = .18 * p.05 = .22 ** p.01 = .28 *** p.001 = .36

weekends in which the majority of the student's time is spent doing something besides studying. This would seem to be a reasonable relationship, for the student with higher ability might well find less time was required in order to learn a given amount of material. The table, however, reveals that there are no significant correlations between the various measures of ability and the number of hours of study that students reported.

As might be expected, the grade point averages of students were correlated with the numbers of hours of study they put in. It was also not surprising when a strong negative correlation between hours of study an weekends without study was revealed.

A positive correlation was found between dating frequency and no-study weekends.

Dating and having a steady girl were found to be correlated and a significant relationship was also found between dating and participation in bull sessions.

A strong negative correlation was found between those who went out with the boys and those who had "steady" girl friends.

Testing the Statistical Hypotheses

As was indicated in Chapter III the first section of this chapter was concerned with a brief descriptive analysis of the data related to those groups of students designated as More Satisfied (MS) and Less Satisfied (LS).

The following section reviews that material related to testing of the statistical hypotheses derived in Chapter III.

Null Hypothesis 1

There will be no difference between MS and LS students on the basis of numerical ability.

Alternate Hypothesis 1

Levels of numerical ability will be higher for MS students than for LS students.

Findings and Discussion: The null hypothesis is not rejected at the .05 level of significance. The alternate hypothesis is rejected. The null hypothesis was not rejected despite the fact that the *t*-test as shown in Table 4.42 was significant at the .10 level, a finding which suggests the possibility of a relationship between a student's level of satisfaction and his numerical ability. Similarly, correlational analyses of the same data shown in Table 4.43 also produced a correlation coefficient that was significant at the .10 level. In this case the .05 level was chosen in order to reduce the risk of rejecting the null hypothesis when the apparent relationship might be due to chance factors alone.

Null Hypothesis 2

There will be no difference between MS and LS students on the basis of verbal ability.

Alternate Hypothesis 2

Levels of verbal ability will be lower for the MS students than for the LS students.

Findings and Discussion: The null hypothesis is not rejected at the .05 level. The alternate hypothesis is rejected. As shown in Table 4.42, differences between the MS and LS students didn't reach

significant levels. It should be noted, however, that the differences that did occur were in the directions predicted in Alternate Hypothesis 2. Similar results are shown in Table 4.43. A correlation coefficient of -.14 would indicate the possibility of weak negative relationship between verbal ability and student satisfaction.

Null Hypothesis 3

There will be no differences between MS and LS students with regard to their opinions of what changes would have made their first two years experience more valuable.

Alternate Hypothesis 3

LS students will express greater concern over the rigidity of the curriculum and its lack of provision for meeting non-vocational developmental needs of students such as those mentioned by Erikson, Sullivan, and White.

Findings and Discussion: A re-examination of Table 4.14 reveals differences between MS and LS students that are significant at the .05 and .01 levels. Therefore, the null hypothesis is rejected.

The LS students differed significantly from the MS students in the following ways.

They felt that they would have benefited if their experience had provided more personal contacts with other classes; had allowed more time for social activities; had given more personal direction in studies and course selection and had provided more emphasis on liberal studies not related to any occupation.

To the extent that these suggested changes are similar to those concerns mentioned by Erikson, Sullivan and White and listed in Chapter I, Alternate Hypothesis 3 is not rejected.

Null Hypothesis 4

There will be no difference between MS and LS students in terms of their expectancies and experiences during their first two years as engineering students.

Findings and Discussion: Data related to the testing of this hypothesis are found in Tables 4.15 through 4.40. Re-examination of these tables reveals that two types of differences exist between the MS and LS students. The first of these refers to a difference in level of expectation or actual experience between the two groups and the other refers to the degree of difference between what they expected and what they actually experienced.

Tables 4.16 and 4.20 for example, show that LS students had significantly lower expectations of their non-technical achievement and the amount of study required to earn "C's" in all courses, than did MS students. By the same token, Tables 4.19 and 4.27 show that LS students actually felt significantly less competent and mature than did the MS students.

In addition to these differences between the MS and LS students in levels of expectation and experience there were the following differences in the accuracy of the expectations of both groups.

Table 4.29 reveals that there was a significant difference between the expected level of non-technical achievement and the level actually attained by LS students. Differences were not significant for MS students, however.

In Table 4.34 another significant difference was found between the expected and actual opportunities for participation in social groups by the MS students. Again differences were not significant for LS students.

In Table 43.5 an even greater difference between expected and actual experiences is found for MS students concerning feelings of social "know-how." Differences were not significant for the LS students.

A final example of this type of difference is found in Table 4.37. Here it can be seen that although differences between expected and actual opportunities reached significant levels for LS students, no such differences existed for MS students.

In light of these differences, the null hypotheis is rejected.

Summary

In this chapter data gathered for the purpose of providing a clearer understanding of factors related to student satisfaction were presented. The subjects selected for the study were designated as More Satisfied (MS) and Less Satisfied (LS) on the basis of a median split of their scores on a satisfaction scale. The analyses involved a comparison of responses of these two groups to the various items on the questionnaire. Chi squares and *t*-tests were used to determine the degree of significance of those differences noted between the MS and LS students.

Four null hypotheses and three alternate hypotheses are tested. Two of the null hypotheses are not rejected but two alternate hypotheses are rejected. No differences were found to exist between the More and Less Satisfied students along the following dimensions:

1. Numerical, Verbal and Total ability
2. Accumulative grade point average
3. Number of weekends spent in some activity other than study
4. Number of dates

5. Having "steady" girl friends
6. How often they went out with the boys
7. Number of "bull sessions" they participated in
8. Amount of sleep
9. Time spent on entertainment
10. Ratings of things contributing to their development

On the other hand, the two groups were found to differ in the following ways:

1. The MS students spent significantly more time studying than did the LS students.
2. The two groups gave different rankings to a list of goals they thought should be emphasized by the university, with LS students ranking "Developing your ability to get along with different people" above "Provide you with a basic general education" and MS students reversing that order.
3. The groups differed as to what gave them the least enjoyment, the MS students listing non-technical courses and the LS students listing organized social activities.
4. LS students expressed the belief that their experience would have been more valuable if it had: provided more personal contacts with other classes; allowed more time for social activities; provided more personal direction in studies and course selection; and provided more emphasis on liberal studies not related to any occupation.
5. LS students were found to have significantly lower expectations than did MS students concerning their level

of achievement in non-technical courses and the amount of study that would be required.

6. The MS students were found to have significantly greater feelings of competency and felt significantly more mature than did the LS students.
7. Only MS students expressed having a significantly greater number of opportunities for participation in social groups than expected and they also stated that they had significantly better feelings concerning their social "know-how" than they anticipated.
8. Only LS students found their level of achievement in non-technical courses to be significantly different from what they expected. They also stated having significantly fewer opportunities to "live-it-up" than they had expected.

A discussion of the findings will be presented in Chapter V.

CHAPTER V

DISCUSSION OF THE FINDINGS

The discussion of the findings follows the order of presentation of the results in Chapter IV.

Satisfaction

As indicated in Chapter IV, measures of student satisfaction were obtained by including six items in the questionnaire that were based on a hypothetical portrait of a satisfied student. It was thought that the satisfied sophomore engineering student would be one who had not felt "out of place" in engineering and whose interest in engineering had increased during his first two years experience. In addition it was thought that such a student would not have considered changing his major and would have been quite satisfied with his classroom experiences. He would have felt that becoming an engineer is worth whatever it cost and would, therefore, look forward to his last two years of engineering courses.

From the results, one cannot conclude that as measured by these questions, students within the College of Engineering are characterized as being highly satisfied with their first two years experience. It would be more accurate to say that they are generally satisfied with their experience. Although the majority of the students gave favorable responses to all of the questions, there was no question for which the majority gave the <u>most</u> favorable response.

On the other hand, it should be pointed out that on no item did more than 2.5 per cent of the students give the least favorable response. That group designated as Less Satisfied for the purpose of the study, therefore, is not seen as dissatisfied, but only less satisfied than the other students in the study.

Table 4.1 presented the results obtained when the More Satisfied students were compared with the Less Satisfied students on those items comprising the satisfaction scale. It revealed that each of the individual items contributing to the total satisfaction score was highly related to that score. For each question the chi square was significant beyond the .001 level. There can be no doubt, therefore, that as measured by these questions, the top half was definitely more satisfied than the bottom half.

Analysis of the remaining items on the questionnaire was done by comparing the MS and LS students and testing the differences between them for statistical significance.

Descriptive Data

Little difference was noted between MS and LS students in the amounts of time allocated to various activities. Although MS students apparently use their weekends for activity other than study more often than do LS students, the difference betweem them did not reach significant levels.

Similar patterns of small but not significant differences were also noted for such things as frequency of dating, the number that report having "steady" girl friends, the number of times per week they go out with

the boys, and the number of "bull sessions" they participate in during an average week.

The one activity for which significant differences appeared between MS and LS students was studying. The MS students reported spending significantly more time studying with 35 per cent of them reporting that they spent 33 hours or more per week in study. Only half as many LS students reported studying that much. It is interesting to note that while MS students report spending more time studying, they also reported spending fewer weekends studying. The relationship is further confused when one observes in Table 4.42 that hours of study and number of weekends in which little studying was done show a strong negative correlation. This would seem to indicate that those MS students who didn't study on weekends simply didn't study as much as those who did.

Comparison of MS and LS students in terms of how much sleep they got and how much time they spent in forms of entertainment other than dating also failed to produce any significant differences. It seems apparent, therefore, that except for the amount of time spent studying, very little difference exists between MS and LS students in how they allocate their time.

The importance of this single difference cannot be discounted, however. Certainly it helps to account for the fact that the MS students have slightly higher grade point averages. Correlations between hours of study and grade point average contained in Table 4.42 also support this relationship at the .10 level.

This difference would also appear to support the suggestion found in the review of the literature that satisfaction might be related to the

frequency with which students defer social gratification. If the MS students spend significantly more time studying than the LS students, then they must logically have less time for other activities, some of which might well be social in nature.

Other findings in the study would tend to discount this idea, however, as the MS students reported having significantly more opportunities for participation in social groups and for more opportunities for boy-girl relationships than expected. In addition they reported having significantly better feelings of social "know-how" than anticipated. This does not sound like the description of a student who is deferring social gratification.

It was a basic assumption of the study that those students who "fit" the system best would be the most satisfied. One measure of that "fit" would be to obtain an idea of what goals they think the university should emphasize, and compare them with the advocated goals of the university. Table 4.11 showed that both groups felt that the most important goal of a university was to provide vocational training. This is not at all surprising in as much as one of the accepted tasks of this age group is to select and prepare for a vocation.

There was disagreement between the MS and LS students as to which of the goals was the second most important, however. The MS students thought that after vocational training should come a basic general education and appreciation of ideas. LS students expressed a greater concern for people by indicating that they thought the second most important goal should be to develop one's ability to get along with different people.

Except for these differences, there was agreement between the MS and LS students as to the rankings of the various goals. It should also be noted that the difference between the first and second rankings for the MS students was almost as large as the difference between the first and third rankings of the LS students. This appears to indicate that the LS students gave higher mean rankings to both their second and third choices than did the MS students. The table also reveals that while the LS students did rank vocational training as the most important goal, the mean rank was not as high as that given by the MS students. This further illustrates the fact that the LS students had broader concerns than did the MS students as the lower ranking resulted from other goals being ranked as high as or higher than vocational training. On the other hand, LS students ranked "Development of moral capacities" and "Preparation for marriage" even lower than did the MS students.

Those differences which appeared between MS and LS students concern-the importance of various goals for a university, were also evident when students were asked to rate certain aspects of their undergraduate education with respect to what they contributed to their development. Although rank orders were identical for the two groups, the mean ratings showed again that LS students were not as enthusiastic about the contributions that technical courses had made to their development. As expected, they gave higher ratings to the contributions of roommates and friends than did the MS students.

It must be pointed out that the differences referred to here are simply differences in mean ratings between the groups of More and Less Satisfied students, and no assertion is made that statistical differences exist between these groups regarding these ratings.

Both MS and LS students found the same activities pleasurable with "personal social activities" receiving the highest rating of both groups. Again it came as no surprise that the LS students rated it higher than MS students. Except for a reversal in the items rated fifth and sixth, the MS students ranked non-technical courses as contributing least to their enjoyment and the LS students ranked organized social activities as contributing least; the rank order for the items was identical.

Because there was an initial assumption made about the nature of the curriculum, namely that it is difficult, subject oriented and rigid, it was hypothesized that some students would not respond positively to it and that these students would most likely comprise the LS group.

Earlier indications of differences between the MS and LS students were confirmed when comparisons were made between the two groups as to what changes they thought would have been valuable. LS students again showed a greater desire for opportunities to interact with people different from themselves. For example, they felt strongly about having more personal contacts with other classes but expressed no more interest than did MS students in having any greater contact with their own classmates or with the faculty. Similarly, they felt that having more time for social activities would have been valuable. All of these are seen as expressions of greater interest in people and broader interests in general. The latter part of that statement is also supported by the fact that significantly more LS students than MS students felt that there should have been more emphasis on liberal studies not related to any occupation, while the MS students consistently displayed greater interest in technical courses.

Significantly more LS students than MS students also expressed a belief that more personal direction in studies and course selection would have been valuable. Further research will be necessary in order to determine what elements of that question students were responding to, but it seems quite probable that both the idea of more personal interaction with someone as well as the desire to obtain a clearer idea of just where they were gaining entered into their response. Both of these elements have been shown to be normal concerns of this age group.

It is noteworthy that other differences which approached but did not reach significance were also in predicted directions. For example, LS students expressed interest in more discussions and fewer lectures and thought that they should have had more help in choosing a major within engineering.

Not surprising either was the fact that the MS students thought that even more emphasis should be placed on occupational or professional preparation. This reaffirmed the technical, vocational orientation of the MS students.

Expectancies and Experiences

The review of the literature revealed several studies that indicated the possibility of a relationship between student satisfaction and the extent to which a student's expectations are realized. Considerable effort was made to explore this dimension within the questionnaire.

The data was first examined to determine whether there existed significant differences between the MS and LS students regarding their level of expectation and their actual experiences.

The results showed that the LS students had expected a significantly lower level of achievement in their non-technical courses than had the MS students. In addition, they had significantly lower expectations of the amount of study that would be required to pass their courses.

These differences are especially noteworthy as it was found that the LS students had somewhat higher verbal ability than did the MS students. In light of this, one might well have predicted that the LS students would have had higher expectations than the MS students in the non-technical courses.

In as much as no difference was found between the two groups regarding their measures of total ability, no explanation is offered for the differences found in the amount of study they expected to be required.

The LS students also reported feeling significantly less competent and less mature than the MS students. Such feelings would obviously not contribute to a student's feeling of satisfaction. They might well cause one to have second thoughts about one's choice of major and they also help explain the fact that the LS students were more interested in a broader education and studies not related to any particular vocation.

These same data were then regrouped and the difference between expected and actual experience was examined for significance.

Both the MS and LS groups reported doing significantly less well on their technical courses than had been anticipated. This might well have tempered their level of satisfaction. The LS students, however, did significantly better than they had anticipated in their non-technical courses. Although this would generally be thought to contribute to one's

level of satisfaction, it seems more probable that it would increase the ambivalence that the LS student felt regarding his choice of engineering as a vocation.

Both groups reported that the curriculum was significantly more theoretical than they had anticipated and that there were significantly fewer opportunities to apply their knowledge than they had expected. In the latter case the difference for the LS students reached significance at the .01 level, while the difference was significant at the .05 level for the MS students.

Lower feelings of competence and fewer opportunities for boy-girl relationships than expected were also reported by both groups.

As mentioned earlier, the MS students reported having significantly more opportunities for participation in social groups and greater feelings of social "know-how" than anticipated. By way of contrast, the LS students found significantly fewer opportunities to "live-it-up" than they had anticipated.

The total effect of these differences is such that the LS students often found their expectations frustrated. In those cases where their experiences exceeded their expectations the effect was to raise questions in their minds as to the appropriateness of their choice of major.

The MS students, while not doing quite as well as they had hoped, did have greater opportunities for social interaction than they had expected. In general, their expectations were also more realistic than those of the LS students.

Supplementary Data

Data concerning the discrepancy between expected and actual experiences provided further indication of a difference between the two groups. In those instances where significant differences were found, it was observed that the MS students more often found things to be better than anticipated, while the LS students more often reported that their actual experiences did not measure up to their expectations.

Such errors in perception or expectations might well have contributed to the basic differences in satisfaction between the two groups since the errors of the MS students resulted in pleasant surprises among their experiences, while the LS students experienced more disappointments.

Additional material relating to perceptual differences between the two groups is included in Appendix C.

Ability and Achievement

Comparisons of MS and LS students on the basis of their ability, as measured by the College Qualifications Test, and their academic achievement, as indicated by their accumulative grade point average, were made in order to test the hypothesis that satisfaction is related to the degree of "fit" between a student and his environment. Although the difference in verbal ability was in the predicted direction, that is, the higher the verbal ability, the lower the satisfaction level in engineering; the difference did not reach significant levels.

Differences in numerical ability were also in the predicted direction and were found to be significant at the .10 level. Although the .05 level was chosen for the rejection of the null hypothesis, differences of this

magnitude are surely a very strong indication of a positive relationship between numerical ability and satisfaction in engineering.

No relationship was found between measures of total ability and levels of satisfaction. Differences between MS and LS students regarding G.P.A. were in a positive direction but did not approach significance.

A further attempt was made to explore the possibility of unanticipated relationships by computing simple correlations for the data on ability, achievement and time allocation.

Correlations significant at the .10 level between satisfaction and both numerical ability and grade point average, while not confirming studies reviewed, do indicate the possibility of such a relationship. The number of hours of study were found to be highly correlated with satisfaction, however.

In addition, significant correlations were found between: numerical ability and the number of weekends with little study, the number of dates and the number of weekends with little study, the number of dates per term and whether students had steady girl friends, and the number of dates and the number of "bull sessions" a student participated in each week.

Significant negative correlations were found between the number of times they went out with the boys each week and whether they had steady girl friends, and the number of hours of study and the number of weekends with little study.

Only the correlation between numerical ability and the number of weekends in which they did little studying appears to be relevant to this study. It seems that those students with higher numerical ability are able to meet the course requirements without having to spend much time

studying on the weekends. Having the weekends free for other activities and thereby meeting some of their non-academic developmental needs, would almost certainly contribute to ones level of satisfaction.

The presentation of a series of correlation coefficients such as is found in Table 4.43 may give rise to the question of their significance. Sakoda, Cohen and Beall have produced tables which enable one to find the chance probability of obtaining a given number of significant results in such a series.[1] According to their calculations, the probability of obtaining 13 results, significant at the .05 level, in a series of 77 tests is less than .001.

These statistics would appear to indicate that the results are in fact due to actual differences or similarities and not to chance alone.

Summary

This chapter has presented a discussion of the results found in Chapter IV.

In Chapter VI the entire study will be summarized, the conclusions stated and the implications for further research presented.

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[1]Sakoda, J. M., Cohen, B. H., and Beall, G. "Test of Significance for a Series of Statistical Tests," Psychological Bulletin, Vol. 50, No. 2, 1954, pp. 172-175.

CHAPTER VI

SUMMARY AND CONCLUSIONS

This chapter contains a summary of the study, a discussion of the findings, and the conclusions drawn from the results of the investigation. Some implications for further research are also suggested.

The Problem

Mounting concern among engineering educators and others interested in the manpower situation has resulted in an increasing number of studies of enrollment and attrition patterns. An extensive review of the literature revealed little research which has contributed insight into the causes of these attrition rates. Surveys conducted within the College of Engineering, while identifying some areas of student complaints, emphasized the fact that little is known about factors related to student satisfaction within the College of Engineering. As a result, this study was conceived to identify factors related to student satisfaction and to provide a more comprehensive and meaningful picture of student satisfaction within the College of Engineering at Michigan State University. The following four goals were established to guide the study:

1. To better understand the expectations and concerns of those students who choose engineering as their college major.
2. To identify factors which may be related to student satisfaction within the College of Engineering.

3. To determine what relationships, if any, exist among a student's level of ability, his level of academic achievement and his level of satisfaction.
4. To formulate hypotheses, whenever possible, to serve as a basis for further investigations.

In attempting to reach these goals a statement of theoretical assumptions was presented. It was theorized that satisfaction is a product of the interaction process between the needs of the student and the demands of the college environment. It was considered to be a feeling that reflects how well an individual is able to resolve the conflicts that arise between his developmental needs and the environmental demands.

It was hypothesized that the demands created by the curriculum of the College of Engineering, emphasizing as it does, achievement in the technical areas, would affect students such that those possessing higher numerical ability were more likely to be satisfied with their experiences. Likewise, it was predicted that students who possessed high verbal ability would be less satisfied with their experiences. It was further predicted that students would be dissatisfied with the rigidity of the curriculum and the fact that there was little provision for meeting the developmental needs of students. It was also hypothesized that satisfaction would be related to the congruence between student expectations and actual experiences.

Review of the Literature

A review of the literature included studies dealing with student satisfaction. Although no studies were found that dealt specifically with satisfaction of engineering students, the findings did suggest that

satisfaction might be related to academic achievement. The evidence concerning the relationship between aptitude and satisfaction was minimal and did not indicate that a significant relationship existed.

Studies pertaining to the relationship between personal needs and the demands of the environment indicated that this relationship could very well influence ones overall satisfaction. Support was also offered for the existence of a relationship between the frequency of deferring social gratification and levels of satisfaction.

In a further review of the literature related to student-environment interaction it was suggested that student dissatisfaction might be the result of unfulfilled expectations in the transition from high school to college.

The Sample and Methodology

The population consisted of all the male students who entered engineering at Michigan State University as first time freshmen in September 1966. The sample was comprised of those students enrolled in a course in mechanics required of students in Metallurgical, Civil, Mechanical and Agricultural Engineering during spring term of 1968. A questionnaire was developed to assess the nature and importance of each student's college experience as it related to his level of satisfaction.

The first portion of the questionnaire consisted of a six item satisfaction scale. Total scores on these six items were placed on a continuum and a median split utilized to divide the group into More Satisfied (MS) and Less Satisfied (LS) groups.

In addition to the measure of satisfaction, the questionnaire gathered data on five variables thought to be related to satisfaction: educational goals, features of the undergraduate experience contributing to their development, features contributing to their enjoyment, elements of the curriculum, and student expectations and experiences. Additional data concerning each student's level of ability, as indicated on the College Qualifications Test, and each student's level of academic achievement, as indicated by the accumulative academic grade point, was obtained from the Office of Student Affairs in the College of Engineering.

Analysis of the data was accomplished through a comparison of the two groups differentiated by the satisfaction scale. Primarily, the chi-square statistic was used to determine whether the respective independent variables were related to satisfaction in the College of Engineering. Where appropriate, however, *t*-tests and simple correlational techniques were also utilized.

Results of the Study

The following results were found to be statistically significant.

1. The MS students reported spending significantly more time studying than did the LS students.
2. The LS students expressed the belief that their first two years experience would have been more valuable if it had:
   a) provided more personal contacts with other classes.
   b) allowed more time for social activities.
   c) provided more personal direction in studies and course selection.

d) provided more emphasis on liberal studies not related to any occupation.

3. The LS students were found to have significantly lower expectations than did MS students concerning:

   a) the level of achievement in non-technical courses.

   b) the amount of study that would be required to earn a "C" grade in all courses.

4. The MS students reported feeling significantly more competent and significantly more mature than did the LS students.

5. Only the MS students expressed having significantly better experiences than had been expected regarding:

   a) opportunities for participation in fraternities and other social groups.

   b) feelings of social "know-how."

6. Only the LS students reported attaining significantly higher levels of achievement in non-technical courses than had been expected.

7. Only the LS students reported having significantly fewer opportunities to "live-it-up" than they had expected.

8. Both the MS and LS students reported that:

   a) their level of achievement in technical courses was significantly lower than expected.

   b) the curriculum contained significantly more theoretical material than expected.

   c) there were significantly fewer opportunities to apply their knowledge than they had expected.

d) they felt significantly less competent than expected.

e) there were significantly fewer opportunities for boy-girl relationships than they expected.

Conclusions and Implications

Within the limitations of this study the following conclusions may be drawn.

1. Null Hypothesis 1 which indicated that there would be no difference between MS and LS students on the basis of numerical ability must not be rejected, since the College Qualifications Test of numerical ability was not able to differentiate the MS students from the LS students at the .05 level of significance. Alternate Hypothesis 1 which stated that MS students would have higher levels of numerical ability than LS students is, therefore, rejected. It should be noted, however, that while the differences found were not large enough to be significant at the .05 level, they did reach significance at the .10 level. These findings are in contrast to those noted in the review of the literature that found no relationship between ability and satisfaction. It seems possible, however, that these differences may be a function of the different levels of ability, necessary to master the required material in the different curricula. Engineering curricula make heavy demands on the students' numerical ability. In such cases where high levels of ability are necessary, but not sufficient conditions for successfully completing a course of study, and the levels of achievement required

are also high, it appears that student satisfaction may be at least partly a function of the amount of ability the student has. Further research is necessary, however, before any conclusions can be drawn concerning such a relationship.

2. Null Hypothesis 2 which stated that there would be no differences between MS and LS students on the basis of verbal ability must not be rejected, since MS and LS students could not be differentiated on the basis of the verbal ability subtest of the College Qualifications Test.

Alternate Hypothesis 2 which indicated that the MS students would have lower levels of verbal ability than LS students is, therefore, rejected. Although these differences did not approach significance at the .05 level, they were in the directions indicated. They were also sufficiently large as to warrant speculation as to the cause. As has been pointed out previously, the curricula of the College of Engineering emphasize technical proficiency almost to the exclusion of non-technical. The only courses of a non-technical nature that are included are those series required by the university for graduation; American Thought and Language, Social Sciences, and Humanities. High levels of achievement in these courses, while contributing to a higher accumulative grade point average, do not receive much attention in the College of Engineering. Rather, attention is focused on a student's technical grade point average and it is this on which decisions regarding admission to upper college at the end of the sophomore year, are based. A student may have a very respectable accumulative grade

point average as a result of high achievement in non-technical courses and be refused admission to upper school on the basis of poor grades in technical courses. The result of this is a de-emphasis of non-technical course work. Students with the ability to do well in these courses are frustrated to the extent that there is little reward for doing so. Lecture rather than discussion techniques that are used in the technical course work, could cause even further frustration of those who could excel at verbal communication. These conditions that exist in the College of Engineering might well result in a certain amount of dissatisfaction among those students who have high levels of verbal ability but find few opportunities to demonstrate them and little reward for doing so.

3. Null Hypothesis 3 which stated that there would be no difference between MS and LS students with regard to their opinions of what changes would have made their first two years experience more valuable must be rejected since significant differences in opinion did occur.

4. Alternate Hypothesis 3 which stated that the LS students would express greater concern over the rigidity of the curriculum and its lack of provision for meeting non-vocational developmental needs of students such as those mentioned by Erikson, Sullivan, and White must not be rejected. That is, it must be accepted to the extent that the desires for more personal contacts with other classes, more time for social activities, more personal direction in studies and course selection and more emphasis on liberal

studies not related to any vocation, as expressed by the LS students, are both expressions of developmental needs and indications of concern over the rigidity of the curriculum. Erikson, Sullivan, and White, as indicated in Chapter I, all mention self-definition as one of the most important issues during this period of life. Resolution of this issue alone requires an increase in interpersonal interaction and the freedom to explore new areas, to expand to one's limits in an effort to define oneself.

5. Null Hypothesis 4 which stated that there would be no differences between MS and LS students in terms of their expectations and actual experiences during their first two years as engineering students, must be rejected since these two groups were found to differ in the following ways:

a) LS students expected a significantly lower level of achievement in non-technical courses and significantly less required study than did the MS students.

b) MS students experienced significantly greater feelings of competency and maturity than did the LS students.

These differences in expectations and experiences between MS and LS students would appear to be indicative of more fundamental differences in the groups. For example, the LS students, though possessing somewhat higher verbal ability than the MS students, still had significantly lower expectations of what their level of achievement in non-technical courses would be. As was noted earlier, the LS students also expressed a desire for more social interaction, more personal direction and a broader and more

flexible curriculum. All of this seems to indicate that these students are less sure of themselves, are not as committed to the ideal of becoming engineers or at least are not sure that they have what it takes to become an engineer. It seems possible, therefore, that there exists a basic difference in the self concepts of the two groups. Although this study was not designed to explore differences such as these, one is inclined to speculate about such a possiblity. Other findings within the study would also appear to support such an idea. Most pertinent is probably the fact that the LS students reported having feelings of competence and maturity that were significantly lower than those of the MS students. Further speculation, however, concerning the possibility of a basic difference in self concept must wait on future research.

6. Sophomore engineering students who are classified as More Satisfied spend significantly more time studying than those students classified as Less Satisfied. As noted earlier, rather than attempt to explicate the cause-effect nature of this relationship, it seems more appropriate at this time to simply consider it as one of concomitance.

7. The contention that the satisfaction scale actually measured satisfaction is supported by the findings of the study. Although by definition the MS and LS students differed from each other to the extent that they scored above or below the median on the satisfaction scale respectively, the MS students indicated that they were indeed more satisfied with their college experience by their

answers on the remaining items of the questionnaire. The MS students for example, indicated few changes that they thought would have made their first two years experience more valuable. Those changes that they did recommend were often for more of the same type of experience. The LS students, however, recommended many changes and they often reflected a desire for something quite removed from engineering.

8. The assumption that satisfaction is a feeling that reflects how well an individual is able to resolve the conflicts that arise between his developmental needs and the demands of the environment is also supported by findings of the study. The MS students were more successful at getting what they wanted out of college. That is, they received what they expected, and reported fewer shortcomings in their experiences. It follows, therefore, that fewer needs would have remained unfulfilled. Further support for this is found in the fact that MS students reported having significantly more opportunities to participate in fraternities and other social groups than they expected. They also reported having significantly more social "know-how" than they expected to have. The assumption received further support in that the LS students as noted earlier, expressed their desire for more opportunities for social interaction, reporting that they had significantly fewer opportunities for such interaction than expected.

Suggestions for Further Research

The findings and conclusions stated in this study give rise to questions which cannot be answered at this time. These questions which could readily be translated into operational hypotheses for use in future investigations, are stated below.

1. What is the affect of major changes in the curricula of college, upon the "fit" of the college's demands and the typical student's need pattern? What relationship do such changes have with student satisfaction, level of performance and rates of attrition?
2. What are the effects of varying levels of incongruence between an individual's needs and environmental demands?
3. What are the guidance possibilities of congruence measures and can such information be used to bring about a reduction in attrition rates?
4. How can discrepancies between levels of student expectations and actual experiences be reduced and is it desirable to do so for all students?
5. What relationships exist among levels of ability, student satisfaction and the requirements of different curricula? Do high levels of ability in areas unrelated to a student's academic major bear any relationship to student dissatisfaction?
6. How is a student's self concept related to the levels of satisfaction that result from his interaction with his environment? What relationships exist, if any, among self concept, satisfaction, ability and achievement?

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APPENDICES

APPENDIX A

The Questionnaire

This questionnaire is designed to obtain your opinions about yourself and your college education. The results will be used to find common concerns among the sophomore class which could provide guidelines for future Engineering Education.

Please answer each question as honestly as you can. The only purpose in asking for your name is to make the study as thorough as possible. In no way will your responses and name be reported to anyone. Your answers will be treated in strictest confidence! As soon as the completion of the data is insured, your name will be torn off and a code number will be used.

Work as quickly as you can, reading each question carefully before deciding upon your best response. Do not skip any items. Answer all questions, even though you may not think about yourself in exactly the way the question is stated.

IMPORTANT: For the purposes of this questionnaire, a Technical Course is defined as: any math or science oriented course.

Please print your name and student number on the top of the next page and begin working.

NAME _____

STUDENT NUMBER _____

Code _____

I. This section of the questionnaire will deal with your feelings about your college experiences.

Please select the answer that most describes how you feel.

1. Have you ever felt "out of place" in Engineering?

_____(a) No, never
_____(b) Yes, but only occasionally
_____(c) Yes, frequently
_____(d) Yes, all of the time

2. Have you ever considered changing your present major?

_____(a) No, never
_____(b) Yes, but not seriously
_____(c) Yes, seriously
_____(d) Yes, and I am going to change

3. How would you describe your attitude towards your classroom experiences during your freshman and sophomore years?

_____(a) Usually satisfied
_____(b) Sometimes satisfied
_____(c) Sometimes dissatisfied
_____(d) Usually dissatisfied

4. How would you describe your interest in becoming an Engineer, over the last two years?

_____(a) Increased greatly
_____(b) Increased somewhat
_____(c) Decreased somewhat
_____(d) Decreased greatly

5. Which one of the following best describes your feelings about Engineering as you look forward to the last two years of Engineering courses?

_____(a) Enthusiastic
_____(b) Hopeful
_____(c) Hesitant
_____(d) Discouraged

6. How do you feel about the cost (time, effort, worry, money, etc) of becoming an Engineer?

_____(a) It's definitely worth it.
_____(b) It's probably worth it.
_____(c) It's probably not worth it.
_____(d) It's definitely not worth it.

Please give as accurate an answer as possible on the following questions.

7. During an average term in Engineering how often did you spend most of a weekend in some activity other than study?

8. How often during an average term did you go out on a date?

9. Do you have a "steady" girl friend? Are "pinned"____ engaged____ married____ ?

10. How often during an average week do you go out with the boys?

11. How many "bull sessions" do you participate in during an average week?

12. What is the average number of hours you spend in study per week?

13. What is the average number of hours of sleep you get per night?

14. How many hours of the week do you spend on entertainment such as movies, television, athletics, fraternities, etc. beyond that spent on dates?

15. If there are other ways in which you spend significant amounts of time, please list them below.

II. College students have different ideas about what the main purposes of their college education should be. Some of these ideas are listed below. As you read this list, consider what educational goals you think should be emphasized by a university. Indicate your opinion by writing:

H--(High) Highly Important M--Of Some Importance L--Little Importance

16. Indicate H, M, or L.

_____A. "Provide vocational training; develop skills and techniques directly applicable to your career."
_____B. "Develop your ability to get along with different kinds of people,"

16. Cont.

_____C. "Provide you with a basic general education and appreciation of ideas."
_____D. "Develop your knowledge and interest in community and world problems."
_____E. "Help develop your moral capacities, ethical standards and values."
_____F. "Prepare you for a happy marriage and family life."

Now, go back and rank the goals you rated "H" by writing next to each "H":
1 - for the most important
2 - for the second most important and so on for all the H's on your list.

Do Not Rank the M's and L's.

17. The following are common features of undergraduate life. Please rate them in the order of the relative contribution each item has made to your overall development and preparation for life after graduation.

Circle one number:

	Contribution						
	High	1	2	3	4	5	6 Low
1. Technical courses		1	2	3	4	5	6
2. Non-technical courses		1	2	3	4	5	6
3. Athletics and sports		1	2	3	4	5	6
4. Personal social activities		1	2	3	4	5	6
5. Organized extracurricular activities		1	2	3	4	5	6
6. Roommates and friends		1	2	3	4	5	6

18. Please rate these same items in terms of how enjoyable each was.

Circle one number:

	Very Enjoyable	1	2	3	4	5	6 Very Unenjoyable
1. Technical courses		1	2	3	4	5	6
2. Non-technical courses		1	2	3	4	5	6
3. Athletics and sports		1	2	3	4	5	6
4. Personal social activities		1	2	3	4	5	6
5. Organized extracurricular activities		1	2	3	4	5	6
6. Roommates and friends		1	2	3	4	5	6

III. The following list gives a choice of possible recommendations for changes within the College of Engineering. Please check the answer that best describes how you feel.

As you see it now, would your freshman and sophomore experience have been more valuable if it had:

		Strongly Disagree	Disagree	Agree	Strongly Agree
19.	Allowed more time for other "intellectual" pursuits?	____	____	____	____
20.	Provided more personal contacts with other classes?	____	____	____	____
21.	Contained fewer lectures, more discussions?	____	____	____	____
22.	Provided more personal contacts with the faculty?	____	____	____	____
23.	Allowed more time for social activities?	____	____	____	____
24.	Given you more personal direction in studies and course selection?	____	____	____	____
25.	Permitted greater freedom in course selection?	____	____	____	____
26.	Allowed more time for extracurricular activities?	____	____	____	____
27.	Provided more personal contacts with classmates?	____	____	____	____
28.	Provided more emphasis on liberal studies not closely related to any occupation?	____	____	____	____
29.	Placed more emphasis on occupational or professional preparation?	____	____	____	____
30.	Allowed more time for activities and and social life?	____	____	____	____
31.	Required more work in courses?	____	____	____	____
32.	Provided greater assistance in choosing a major within Engineering?	____	____	____	____
33.	Emphasized theory more than application?	____	____	____	____

IV. In the following items, please comment briefly regarding what you expected and what you actually found concerning these aspects of undergraduate life.

34. What level of achievement did you expect to attain in your technical courses?

35. What level of achievement did you actually attain in your technical courses?

36. What level of achievement did you expect to attain in your non-technical courses?

37. What level of achievement did you actually attain in your non-technical courses?

38. How much study did you expect would be required to earn at least "C" grades in all courses?

39. How much study did you actually find was required to earn at least a "C" in all courses?

40. What kind of opportunities for participation in fraternities and other social groups did you expect to find while enrolled in the College of Engineering?

41. What kind of opportunities did you find actually existed for participation in fraternities and other social groups?

42. What did you expect to find in Engineering regarding the theoretical nature of the curriculum?

43. What did you actually find regarding the theoretical nature of the curriculum?

44. What opportunities did you expect to have to apply your knowledge?

45. What opportunities did you actually have to apply your knowledge?

46. How competent did you expect you would feel in Engineering?

47. How competent did you actually feel in Engineering?

48. What kind of feelings regarding social "know-how" did you expect to have?

49. What kind of feelings regarding social "know-how" did you actually have?

50. What opportunities for developing boy-girl relationships did you expect to find?

51. What kind of opportunities for boy-girl relationships did you actually find?

_____

_____

52. What kind of opportunities to work and gain economic independence did you expect to find?

_____

_____

53. What kind of opportunities did you actually have to work and gain economic independence?

_____

_____

54. How much freedom from parental control and influence did you expect to find?

_____

_____

55. How much freedom from parental control and influence did you actually find?

_____

_____

56. What kind of feelings about being "grown-up" or mature did you expect to have?

_____

_____

57. What kind of feelings about being "grown-up" and mature did you actually have?

_____

_____

58. What kind of opportunities did you expect to have to "live-it-up?"

_____

_____

59. What kind of opportunities did you actually find you had to "live-it-up?"

_____

_____

APPENDIX B

TABLE B1

Comparison of Sample Used in Study with Random Sample of Sophomores Regarding College Qualification Test Scores and Accumulative Grade Point Average

TABLE B1 Results of *t*-test obtained when comparing subjects used in study with a sample of sophomore engineering students chosen at random, with respect to aptitude (CQT-total score) and achievement (accumulative grade point average)

Variable	df	*t* Values*
College Qualification Test Total Score	161	.482
Accumulative Grade Point Average	161	.009

* These values not significant at the .05 level.

APPENDIX C

Material Relating to Perceptual Differences
Between the More and Less Satisfied Students

TABLE C1 Comparison of More Satisfied (MS) and Less Satisfied (LS) students with regards to their perception of how they saw the time spent studying

		Not Much	Fair Amount	Quite A Lot	
MS	Students	15	19	6	Avg./Wk. = 28.8 Hrs.
	Hrs./Week	26.6	29.2	40.5	
LS	Students	16	13	9	Avg./Wk. = 23.8 Hrs.
	Hrs./Week	19.9	25.3	25.9	

As Table C1 clearly shows, there was a distinct difference between the MS students and the LS students with regards to how they saw the amounts of time they spent studying. Even those students among the LS group who felt they had spent quite a lot of time studying, averaged less time per week studying than did those students among the MS group who felt that they hadn't spent much time studying. This would appear to indicate that a student's level of satisfaction greatly affects his perception.

The average number of hours of study per week for all students was found to be 26.6 hours.

As Table C2 indicates, significant differences were found. The average number of hours spent studying was compared with the student's perception of whether the amount he spent constituted, "not much," a "fair amount" or "quite a lot" of time.

TABLE C2

	Not Much	Fair Amount	Quite A Lot	
21 Hrs./Wk. or less	6	12	10	
	21.4	42.8	35.7	
22-30 Hrs./Wk.	8	14	3	$x^2 = 11.290$*
	32.0	56.0	12.0	df = 4
31 Hrs./Wk. or more	14	8	3	
	56.0	32.0	12.0	

* Significant $<$ .05 level

Note: In each cell, percentages are given below corresponding frequencies.