# RELATIONSHIP BETWEEN STUDENT INSTRUCTIONAL RATINGS AND STUDENT - FACULTY PSYCHOLOGICAL TYPES

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This is to certify that the

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Logan Fink Blank

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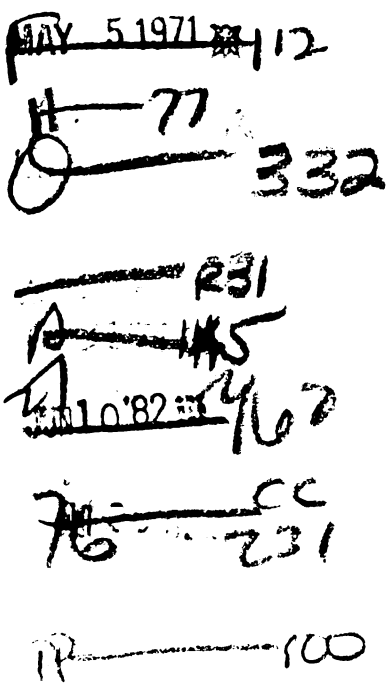
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ABSTRACT

RELATIONSHIP BETWEEN STUDENT INSTRUCTIONAL RATINGS AND STUDENT-FACULTY PSYCHOLOGICAL TYPES

by Logan F. Blank

Students in American colleges and universities are insisting they should have an opportunity to evaluate their undergraduate instructional experiences. Colleges and universities are responding to such student requests by implementing an increasing number of student instructional evaluation systems. In spite of many unanswered questions about the validity and consequences of such student evaluations, student instructional ratings are being compiled and used for comparative purposes.

A majority of the student instructional evaluation programs involve a rating system by students. A variety of studies have found little or no relationship between student instructional ratings and such factors as sex, size of class, grade level, grades, and instructional techniques. The validity and the educational implications of student instructional ratings are central questions in most of the controversial issues related to student ratings of instruction.

Logan F. Blank

The study was conceived to determine if student instructional ratings as measured by Student Instructional Rating Reports were related to student and faculty psychological Myers-Briggs types. An association of particular attitudes, values, and behaviors for a psychological type provided the theoretical structure for the study. Asserted commonalities and differences in psychological behaviors of students and instructors were the basis for predicting a relationship between student instructional ratings and student-instructor psychological types.

Data for the study were collected from students and faculty who were enrolled in or teaching courses offered by the Department of Electrical Engineering at Michigan State University during Spring Term, 1969. The population was designated as the junior-senior electrical and mechanical engineering students and instructors for these courses. The sample included 297 students and 9 instructors. Psychological types of students and instructors were identified with the Myers-Briggs Type Indicator. Each student completed a Student Instructional Rating Report and identified his responses.

Frequencies of Myers-Briggs Types were reported and analyzed to describe the distribution of psychological types for students and instructors.

Mean student instructional ratings were calculated for each of twenty individual items of the Student Instructional Rating Report (SIRR) and for the five main categories of the SIRR Composite

Profile. These data were used in correlation studies of the student responses. A two way analysis of variance model was used in testing for significant differences in student ratings among 14 student psychological types and 3 instructor psychological types. Interaction tests between student and faculty types were also included. The student instructional ratings were also studied by comparisons of student responses for individual classes.

The analysis of variance test provided tentative results which indicated a relationship between the engineering student instructional ratings and instructor psychological type for Instructor Involvement, Student Interest, and Student-Instructor Interaction. From post-hoc comparisons, it was possible to conclude that engineering students rated INTJ instructor type lower or most favorably. Interaction between student and instructor psychological types was not indicated; the results were insufficient to support the predicted relationship of student ratings and student psychological types.

The dominant or modal type for the engineering instructors was INTJ. A halo effect related to this modal instructor type was suspected in the overall most favorable ratings by students, but the students did differentiate between individual INTJ instructors. The most favorable student ratings for INTJ type instructors was noteworthy because this instructor type was also theoretically the most ideal for research.

Among the junior-senior mechanical and engineering students in the study, INTJ and ISTJ were modal types; the relative absence of ESFP and INFJ student types was noted. Sensing type students were more frequent among the mechanical engineering students than electrical engineering students.

Cooperation in the study by engineering instructors was unanimous in contrast to a general assumption of opposition to student ratings by faculty.

# RELATIONSHIP BETWEEN STUDENT INSTRUCTIONAL RATINGS AND STUDENT-FACULTY PSYCHOLOGICAL TYPES

By

Logan F. Blank

A THESIS

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Dedicated to

Shirley, Julie, and Elby

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# CHAPTER I

## STATEMENT OF THE PROBLEM

American college students are requesting and obtaining more influence in decisions which affect their education, including classroom instruction. They want an opportunity to evaluate their instructors and courses. In spite of many unanswered questions about the validity and use of student instructional evaluations, many colleges and universities have implemented programs which enable students to evaluate their classes and courses.

As the number of student rating systems increase on college and university campuses, there is a critical need to continue the search for data which will provide a basis for understanding the nature of student ratings. There is a common belief that a student's perception of his classroom experience as indicated by student ratings should be a valuable source of information for use in the improvement of undergraduate instruction. However, there is little agreement as to how student ratings can be used for this purpose. Even among individuals who agree that students should be given a chance to evaluate their classes and instructors, there is controversy

regarding the factors which are related to student ratings, the validity of student ratings, and the educational implications of student ratings.

Student rating of instruction is taking place. Student instructional ratings are being collected and compiled on many campuses. A common problem in studies of student ratings is an explanation of differences in student ratings. Without such data, the value of student ratings is uncertain to the instructor being rated, and to students and others who try to interpret the ratings.

The concept of certain psychological behaviors being more conducive to a classroom environment provides a structure for studying such questions as why students in the same class differ in their opinions of the instructor. An individual instructor may likewise wonder why his instructional activities seem to be more conducive with certain students. Commonalities and differences in psychological behaviors among students and between students and an instructor might be reflected in student instructional ratings. Evidence to support a functional relationship between student and faculty psychological behaviors and student ratings would be important data for use in considering the many questions about the meaning of student ratings and their educational implications. If student ratings are related to personal variables of instructors and of students, the effects of such a relationship should be recognized. Decisions regarding the

consequences of student ratings should involve consideration of such a relationship if it does exist.

## Purpose

The purpose of the research was to determine if student instructional ratings as indicated by Student Instructional Rating Reports were related to the Myers-Briggs psychological types of undergraduates and their instructors.

## Background for the Study

Ineffective teaching or neglect of undergraduate instruction is often cited as a basis for discontent among college students. Students have criticized the undergraduate instruction in practically all academic areas, including engineering. Support for such student criticism of instruction is provided by a variety of sources. Criticism of curriculum and instruction is one way by which undergraduates have promoted numerous changes in higher education. Frederick Rudolph (1965) provides numerous examples which demonstrate the many ways in which students have reformed American higher education. He suggests that students are actually the change agents in higher education; he further suggests that neglect of college and university students is actually a tradition. The neglect of undergraduates, including classroom teaching, is undoubtedly related to the desire of students to formally evaluate their classroom experiences.

Evaluation of instructors and specific courses always takes place among students. An instructor's reputation among students is based on uncorrelated rumors and student peer group norms. Frederick Gwynn (1966) concludes that the disorganized feedback of student evaluation is one of the basic reasons for the continued existence of weak teaching.

The advisability of standardized student ratings of instruction is widely supported. F. M. Hechinger (1965), education editor of the New York Times states:

> "Students have persuaded the educational leadership that student's voice on campus matters deserves to be heard and that their complaints about inadequate teaching and a curriculum out of step with contemporary society are often justified."

Many colleges and universities are attempting to implement programs for the student which will enable students to have the opportunity of evaluating their classroom instructors. Rayder (1966) states there seem to be as many different methodologies and instruments used for assessing student attitudes as there are institutions of higher learning.

In 1967, a Committee on Undergraduate Education was appointed at Michigan State University to re-examine the undergraduate program and to propose desirable changes. The Committee

on Undergraduate Education's final report is entitled, Improving Undergraduate Education. The report includes many reasons for the need to improve undergraduate teaching. Some of the reported reasons correspond to those cited earlier. The report suggests additional procedures and objectives for improving undergraduate instruction. One section of the report (pp. 37-41) is especially relevant to this study because it recommends university wide development and use of student instructional ratings. The committee's report also recommends the accumulation of such data to establish normative instructional ratings which can be disseminated to instructors for personal comparative purposes.

The need for improving undergraduate instruction is recognized by many critics of higher education. The use of student ratings of instruction is proposed primarily as a means for reporting recognized relative weaknesses to instructors by the students. There are many issues and problems related to the validity of student ratings, the use of such ratings, and the consequences of student ratings. Although there is disagreement about these specific factors, there does appear to be some general agreement of the advisability to obtain some type of formal feedback from students about classroom instructional experiences. The Michigan State University report, Improving Undergraduate Education, cites the importance of sampling reactions from students and concludes that the students are a vital source of data for the improvement of classroom instruction.

"If a student's perceptions, attitudes, and beliefs interfere with his learning, the existence of these perceptions, attitudes, and beliefs is important even if they are not accurate" (1967, p. 39).

It is difficult to establish a valid basis for denying students an opportunity to give a personal estimate of their classroom instructional experience. There are many good arguments which identify reasons why student ratings are imperfect and questionable. However, the fact remains that the individual student, as the primary target of classroom instruction, is the only real source of data about his personal reaction to the classroom instruction. A basic assumption of the study is each student can best estimate his personal opinion of the classroom instruction which he encounters. (The accuracy and validity of student opinions are not specifically tested in the study). The assumption makes it necessary to search for a variable or variables which can account for the differences among student ratings. There is little doubt that students differ in their verbal opinions of different courses and different instructors. Experience with students also indicates a difference of student opinion and ratings of their classroom experience even though they are in the same course with the same instructor.

If student instructional ratings are related to student-instructor psychological types such as Myers-Briggs Indicator types, the existence of such a relationship can be considered in analyzing student evaluation of undergraduate instruction.

Ethical or valid use of student instructional ratings is also a crucial matter. The study should provide a greater understanding of differences in student instructional ratings for use in making more intelligent interpretations of student ratings.

## Theory

A basic concept of the study of undergraduate student instructional ratings is a definition of personality in terms of psychological behaviors similar to the definition of personality by Maddi (1968, p. 10).

> Personality is a stable set of characteristics and tendencies that determine those commonalities and differences in the psychological behavior (thoughts, feelings, and actions) of people that have continuity in time.

An individual instructor's or student's particular combination of psychological behaviors designates his personal pyschological type. Classroom instruction activities of an instructor are influenced by the instructor's psychological type. A student's psychological type determines his thoughts, feelings, and actions in the classroom. The commonalities and differences in psychological behaviors (thoughts, feelings, and actions) of undergraduate students and their instructors are both crucial elements of the classroom instruction because each individual's specific combination of dominant psychological behaviors (student and instructor) will be associated with particular values, interests, skills, and activities.

If certain combinations of psychological behaviors and their associated values, interests, skills, and activities are considered as specific psychological preference types, it can be asserted that particular psychological preference types should be more conducive to the classroom functions of instructors and students. Preferences for theoretical concepts and knowledge should make the usual classroom experiences more satisfying and agreeable to students who prefer to use intuition and thinking in perception and judgement as opposed to students who prefer sensing and feeling. An instructor's psychological preferences should also be more conducive to certain types of classroom instructional performance such as lectures, theoretical concepts, discussions, or practical demonstrations.

If the psychological type variations and differences are warranted assumptions, it is logical to predict that a student's opinion of a particular instructor will probably be related to the commonalities and differences between his psychological type and his instructor's psychological type. The psychological types of students and instructors are thus considered to be crucial factors in determining their personal styles of classroom behavior. The commonalities and differences between psychological types of students and an instructor actually establish the interpersonal environment of a particular classroom. The similarities and differences in psychological types of students and an instructor provide a basis

for assuming a relationship between the instructional ratings of the instructor due to the associated commonalities and differences in particular values, interests, academic thinking, and behaviors of students and instructors.

## Hypothesis

The general hypothesis of the study was derived from the assumptions of commonalities and differences among and between psychological types. The study is based on the general hypothesis of a relationship between student instructional ratings and the psychological preference types of students and their instructors.

Different interests, values, and behavior by students and instructors are theoretically asserted from differences in psychological preference types. These differences should be reflected in the student evaluations of their classroom instructional experiences.

## Operational Hypothesis

The generalized hypothesis of the study is specifically investigated in the form of the following hypotheses:

> There are significant differences in student instructional ratings among students of different Myers-Briggs psychological types.
>
> There are significant differences in student instructional ratings among instructors of different Myers-Briggs psychological types.
>
> There are significant differences in student instructional ratings due to the interaction of student and instructor psychological types.

Alternative hypotheses would be stated in the null hypothesis form of no differences in student ratings for each of the predictive hypotheses.

## Assumptions

The following assumptions were an integral part of the study:

1. The design of the study permitted the usual interaction of students and instructors in the classroom. The study procedures were accomplished without establishing any grounds for suspecting biased results.

2. The responses of the students and instructors were honest and unbiased on the instruments. The obtained data were truly representative of student instructional ratings and psychological preference types of students and faculty.

3. The theoretical typology accurately represented different psychological preference types.

4. The attitudes, interests, and behaviors associated with the specific preference types were actually differentiated and were not confounded.

5. The student-instructor classroom activity in Spring Term 1969 was equivalent to that of other terms in the year.

## Definitions

1. Psychological Preference Type - A specific psychological type as identified by the Myers-Briggs Type Indicator.

2. Student Ratings - Responses by students to indicate their evaluation of various aspects of their classroom experiences. The ratings are considered

in terms of five specific categories each of which includes specific student responses for four separate statements.

3. Student-Classroom Instructional Experience - The classroom activities between students and instructors in a classroom for a scheduled class of a course being offered as a part of the curriculum.

4. Personality - Used in the concept of type which is structured by the person's preference for the use of perception and judgement as proposed by Jung (1923).

5. Perception - Processes of becoming aware of things or people or occurrences or ideas.

6. Judgement - Processes of coming to conclusions about what has been perceived.

7. Extraversion - Introversion - Refers to the preferred target for a person's perception.

8. Sensing-Intuition - Two methods of perceiving: the first, directly through the five basic senses; the second, indirectly through the unconscious association with external perception.

9. Thinking-Feeling - Two ways of judging or making conclusions; they are logical-impersonal and personal-subjective respectively.

## Limitations

The study is exploratory as a result of the specified objectives and purpose. The unique conditions of the confidential data in the study prescribed some real limitations on the opportunity for a cooperative population. The opportunity to conduct the study in the Department of Electrical Engineering was a primary factor in the selection of students and faculty for the study.

There are no controlled studies which have studied identified student instructional ratings according to the psychological types of students and instructors. A lack of normative data for the instrument used in obtaining student instructional ratings also was a basis for the exploratory nature of the study.

The results of the study are of particular interest to the College of Engineering at Michigan State University. The limitations of the study and implications of the results for other groups of undergraduate students and their instructors are to be decided by individuals who wish to relate the results of the study to other populations of students and instructors. The appropriateness of the study to other populations must be interpreted by the person who can estimate if the other population of interest is similar to or unlike the students and faculty of the study.

# CHAPTER II

## RELATED LITERATURE AND RESEARCH

College instruction is a major concern of the study, but the major emphasis is to investigate student instructional ratings. For this reason, Chapter II does not attempt to present a comprehensive discussion of research on college instruction. One general conclusion regarding research on instruction is appropriate because it establishes the rational for different types of research related to instruction. The studies reported in Handbook of Research on Teaching (McKeachie, 1963, pp. 1118-1172) support the conclusion expressed by many researchers such as Lehman (1961, p. 341).

> Research on instructional methods, class size and use of various media shows no distinct advantage for any particular approach in regard to learning outcomes. Further, without more evidence than is available in research studies, it is not possible to ascertain the exact characteristics of the methods studied. One man's discussion may be another man's lecture. Obviously, then the exact reproduction of these methods with the expectation of receiving the identical results reported is neither possible nor reasonable.

The major focus of the study is student instructional ratings rather than the actual instruction. Therefore, the discussion in

Chapter II is focused on research which is related to student evaluation or rating of instruction. Research which implies the student ratings or evaluation might be a function of faculty and student personality types is also presented. The manner in which these two factors are pertinent to a more realistic basis for studying the interpersonal or psychological factors operating in the classroom is also included.

Student Rating of Instruction

As the undergraduate students succeed in gaining a voice in the influential processes of activities which concern them directly, they are obviously seeking to be able to evaluate the undergraduate instruction which they encounter. The student opinions of inadequate and ineffective instruction are supported by several studies of college and university instruction. A study at Cornell (Kahn, 1965) included the following findings:

1. Grossly inadequate teaching occurs in more instances than is tolerable.

2. There can be no doubt that student dissatisfaction with undergraduate instruction has basis in fact.

3. There is only one ultimate determinant of the quality of undergraduate instruction and only one ultimate source of its improvement--the individual teacher himself.

Anonomous student evaluations were recommended by the committee at Cornell and financially supported to provide campus-wide student evaluations of courses.

Frederick Gwynn (1966) suggests that ineffectiveness of much college teaching might be a major cause of much campus discontent and believes that the disorganization or lack of uniform feedback from students to instructors is a problem in any attempt to improve teaching. Controlled student ratings is proposed as a means to obtain information which can be used by individual instructors to recognize poor teaching and thereby improve it, if they desire to do so.

Similar to the Cornell report and the recommendation by Gywnn, and like many other college and universities, a study of undergraduate education was conducted by a faculty committee at Michigan State University. Appointed in 1967, the Committee on Undergraduate Education included the quality of undergraduate teaching in its study. In the Committee's report, Improving Undergraduate Education, they recommended several means to improve the quality of instruction, including student evaluation of teaching. The report considered the question of student qualifications to judge the teaching they experience. Admitting the question is a valid one, the report further stated "if a student's perceptions, attitudes, and beliefs interfere with his learning, the existence of these perceptions, attitudes, and beliefs is important even if they are not accurate" (1967, p. 39).

## Student Ratings and Characteristics of Faculty and Students

Much of the research on the investigation of characteristics of college students as they relate to the student ratings of instructors

concentrated on variables such as grades, time sequences, student achievement, class level, and class size. No differences in student ratings were found when grades were considered in a study by Clark and Keller (1954).

A study by Comaford (1951) found a ratio of nineteen to one (19 to 1) increases to decreases in student ratings when students rated the same instructors which they had rated two quarters earlier.

A major conclusion of Rayder's study (1966) was similar to the findings of Remmers (1939), Echert (1950), and Voeks and French (1960), all of whom found little or no relationship between the instructional ratings by a student and the expected or received grades of the student.

A study by Remmers (1963) reported no significant differences in ratings between overachievers and underachievers. Class size (Guthrie, 1954), course level (Crannel, 1948), and sex (McKeachie, 1959) did not influence student ratings of instructors. Rayder's study in 1966 investigated these and other variables for possible correlations with instructor ratings by students. Based on a statistical analysis of data collected on eighty-seven (87) college instructors from four thousand (4, 000) student rating scales, Rayder concluded that "student ratings of instructors were not substantially related to student's sex, age, grade level, major area, grade point average, or grades previously received from the instructor."

The research findings on teacher characteristics are relatively vague and conflicting. Rayder's study (1966) did not support the earlier findings of a positive relationship between faculty rank and high ratings. His findings indicated younger and less experienced instructors received better ratings by students. In general, the studies of college teacher characteristics have been rare. According to Gage (1961), "Both experimental studies of teaching methods and correlational studies of teacher's traits have been laboring with variables too grossly defined to be of much significance. This viewpoint is also expressed in the review of research on college teaching by Echert and Neale (1965).

Personality Factors of Student-Instructor Interaction

The importance of considering variables to discover individual differences among teachers and students is stressed by Nevitt Sanford who discussed how the methodological pitfalls of much research on teaching has drawn attention to the need to consider techniques or procedures as functions which are occurring in the context of interpersonal relations. "Variables in the teacher, in the student, and in the interaction between the two are bound to influence the outcome" (Sanford, 1967, p. 285).

Katz and Adelson stress the same types of factors as most relevant for studying the instructor-student interaction. Katz emphasizes the influence of an instructor's personality variables on

his teaching function, which in turn, affects the student (1967, pp. 365-395). Adelson discusses the teacher as a model for a student in his seeking, accepting, and resisting models (1967, pp. 396-418). If personality factors are important to the student-instructor interaction (research findings imply it is probably most important) as stated by Katz, Sanford, and others, it is essential to delineate personality variables which are influential to the classroom interaction of student and instructor.

The Myers-Briggs Type Indicator (MBTI) has been utilized for various types of research efforts relating to personality types. The instrument has been tested for reliability, validity, and other psychometric properties by Braun (1965), Conary (1965), Grant (1965), Stricker and Ross (1963, 1964, 1965), and others. The results of the studies tended to support the use of the MBTI as a means to classify people into mutually exclusive types on the basis of a person's self-reported psychological preferences (Buros, 1965).

Studies of characteristics of teachers, counselors, principals, and students have been conducted at the elementary, secondary, and college level with the Myers-Briggs Type Indicator (MBTI). Helton's study (1964) of able twelfth grade males demonstrated that persistors were more introvertive and intuitive while the non-persistors were more extraverted and sensing.

Jones' (1967) research on faculty perceptions provided evidence to demonstrate the preference of faculty for intuition and

judging as ideal for students and a difference between faculty preference type and faculty perceptions of the typical student. Likewise Morris (1964) found a significant difference between female persistors in an advanced placement program from nonpersistors on intuition and perception measures from the MBTI.

Schmidt and Fretz' (1965) study of the effects of teacher-student similarity on achievement, improvement, and satisfaction in an educational skills course revealed little evidence of student-teacher interaction along measurable personality dimensions although specific differences in improvement and satisfaction were found among various groups of students who were least like or more similar to their teachers in certain types of psychological preferences.

Similar studies of the effects in counseling activities have been made to determine if type similarities are significant. Mendelsohn and Geller (1963, 1965, 1967) conducted several studies of this kind. Their research indicated that the personality type of a client affected the decision to seek counseling, and the matching of client-counselor was an important determinant of counseling effectiveness.

The research findings tended to support the theory of effectiveness or mutual understanding between similar personality types. If this theory can be supported for client-counselor effectiveness studies, and for isolated cases of classroom effectiveness between students and instructors, it was reasonable to test the theory in relation to student instructional ratings in an attempt to better isolate variables which are related to student instructional ratings.

The Michigan State University report, Improving Undergraduate Education (1967), stated the desire for each instructor to improve his teaching for all students. Such an overall improvement may or may not be possible, but if student instructional ratings are related to student and instructor psychological types, the potential for improving instruction would be increased due to an awareness of psychological variables which are involved in the relationship.

# CHAPTER III

# METHODOLOGY AND PROCEDURES OF THE STUDY

It is appropriate to note a very special set of conditions which was necessary to conduct the study. Due to the design of the study, access to individual instructional ratings of faculty members was essential. The analysis required this kind of data which is usually available only to the instructor himself. Furthermore, the design required each student to identify his personal instructional ratings. Both types of extremely personal information were essential to the procedures of the study. Confidence by the participating students and instructors in the ethical use of this data was crucial to obtaining unbiased data for the study.

## Instruments

Two instruments were used to obtain the required data for the study. Both instruments--Myers-Briggs Type Indicator and Student Instructional Rating Report Form--have been developed for use in research. Each instrument has been subjected to specific research efforts for the purpose of establishing the reliability and validity of the respective instruments.

Myers-Briggs Type Indicator (MBTI)

The Myers-Briggs Type Indicator is an experimental instrument to test and verify hypotheses regarding variations in behavior of normal human beings. Implementation of C. G. Jung's theory of personality type is the major purpose of the Myers-Briggs Type Indicator. According to its designers, Isabel B. Myers and Katharine C. Briggs, "the indicator aims to ascertain, from self-reports of easily reported reactions, people's basic preferences in regard to perception and judgement, so that effects of the preferences and their combinations may be established by research and put to practical use" (Myers, 1962, p. 1).

C. G. Jung's theory of type includes attitudes of extraversion or introversion and functions of thinking or feeling and sensing or intuition. Jung's theory hypothesizes a classification of personality types which includes all possible combinations of the two attitudes and four functions. From a basic assumption of differences among individuals in the use of perception and judgement, Jung's theory suggests a theoretical basis for orderly and consistent patterns of behavior which otherwise seem to be relatively random and unpredictable (Jung, 1923). According to Jung's analytical psychology, the role of perception and judgement is the basic structure because they govern an individual's behavior from both his perceptions of himself and his environment plus the meanings things have for him (Combs and Snygg, 1959, p. 17).

The attitudes and functions of Jung's typology are paralleled by the conceptual behavioral categories of the Myers-Briggs Type Indicator. Except for a fourth category (Judging-Perception), added by Myers, the three other categories are very similar to the Jungian concepts. The four behavioral categories are based on differences in mental preferences of individuals as they relate themselves to their environment. The differences in which people prefer to use their minds for the purpose of perception and judgement are theoretically responsible for an individual's mental attitude and processes which determine a large part of his behavior. An individual's behavior is thus related to or "affected by the processes of perception and judgement" (Myers, 1962, p. 51).

The Myers-Briggs Type Indicator was originally developed by Mrs. Katharine C. Briggs and Mrs. Isabel B. Myers. Six years of extensive revision and development occurred before the publication and release of Form F in 1962. The instrument classifies people according to their self reported behavior, preferences, and value judgements into dichotomous categories along each of four dimensions: Extraversion-Introversion (E-I), Sensation-Intuition (S-N), Thinking-Feeling (T-F), and Judgement-Perception (J-P). Form F of the MBTI was used in the study. Form F (MBTI) consists of a series of fifty-one (51) phrase questions and forty-four (44) word pairs requiring forced choice by the respondent unless he elects not to answer. The instrument is untimed, self-reporting, and essentially self-administering.

The Four Preferences Judgement and perception are basic behaviors which are involved in the four MBTI indices of preferences. The initial category involves the manner in which a person directs these perceptive behaviors--internally (introverted) or externally (extroverted); the second category is determined by the person's preference of perceiving, either by sensing or by intuition; in judging to make decisions, a person can prefer thinking or feeling; and finally a judging or perceiving preference exists for the person's use in dealing with his environment. The Myers-Briggs Type Indicator is designed to measure a person's preference for each of these four preference indices and to classify him as a particular type on the basis of his particular combination of preferences.

Each psychological type is conceived of as being categorical. A person's type signifies extraversion or introversion, sensing or intuition, thinking or feeling, and judging or perceiving. The sixteen psychological types of the Myers-Briggs Indicator are included in Tables 3-1 and 3-2. The behavioral contribution of each preference is described for each of the psychological types.

Validity Research efforts to assess the validity of the Myers-Briggs Type Indicator are an ongoing process. Studies which investigated its validity have indicated that identified types relate meaningfully to a wide range of variables including personality, ability, interest, value, aptitude and performance measures, academic choice, and behavior ratings (Buros).

Table 3-1 Myers-Briggs Type Table Indicating Behavioral Contribution Made by Each Preference to Each Sensing Type.*

| | | Sensing Types (S) | |
|---|---|---|---|
| | | With Thinking (T) | With Feeling (F) |
| (I) Introverts | Judging (J) | I - Depth, concentration<br>S - Thorough, respect for detail<br>T - Analysis, logic, critical<br>J - Organization | I - Depth, concentration<br>S - Thorough, respect for detail<br>F - Sympathetic toward people<br>J - Organization |
| | Perceptive (P) | I - Depth, concentration<br>S - Realism, observation<br>T - Capacity for analysis-logic<br>P - Adaptability | I - Depth, concentration<br>S - Observation, attention to detail<br>F - Capacity for devotion-sympathy<br>P - Adaptability |
| (E) Extraverts | Perceptive (P) | E - Ease with environment<br>S - Observation, realism, enjoyment<br>T - Impersonal, mech. ability<br>P - Adaptability | E - Ease with environment<br>S - Observation, realism, enjoyment<br>F - Sociability, no analytical powers<br>P - Adaptability |
| | Judging (J) | E - Ease with environment<br>S - Practical, reliance on experience<br>T - Logical, executive, decisive, critical, demands efficiency<br>J - Organization | E - Ease with environment<br>S - Relies on experience-observation, analysis<br>F - Sympathetic awareness of people, grasp of group feeling<br>J - Organization |

*Myers, 1962, p. 66

Table 3-2 Myers-Briggs Type Table Indicating Behavioral Contribution Made by Each Preference to Each Intuitive Type. *

| | | Intuitive Types (N) | |
|---|---|---|---|
| | | With Feeling (F) | With Thinking (T) |
| (I) Introverts | Judging (J) | I - Depth, concentration<br>N - Insight, originality, grasp of complicated<br>F - Sympathetic-understanding toward people<br>J - Organization | I - Depth, concentration<br>N - Insight, originality, grasp of complicated<br>T - Analysis, logic, impersonal, critical<br>J - Organization |
| | Perceptive (P) | I - Depth, concentration<br>N - Insight, ingenuity, grasp of complicated<br>F - Capacity for devotion & sympathy<br>P - Adaptability | I - Depth, concentration<br>N - Insight, ingenuity, grasp of complicated<br>T - Capacity for analysis & logic<br>P - Adaptability |
| (E) Extraverts | Perceptive (P) | E - Ease with environment<br>N - Initiative, versatility, ingenuity invention<br>F - Enthusiasm, charm, insight into people<br>P - Adaptability | E - Ease with environment<br>N - Drive for projects, initiative, versatility<br>T - Objectivity, analysis, some executive ability<br>P - Adaptability |
| | Judging (J) | E - Ease with environment<br>N - Interest in possibilities, language skill<br>F - Sympathetic toward people, grasp of group feeling<br>J - Organization | E - Ease with environment<br>N - Aware of possibilities, insight, bent for experiment<br>T - Logical, executive, decisive, demands efficiency<br>J - Organization |

*Myers, 1962, p. 67.

Correlations were significant (.05 or less) between the Myers-Briggs Indicator and the Gray-Wheelwright Psychological Type Questionnaire which is based on similar theoretical concepts (Grant, 1965b; Stricker and Ross, 1964b). Correlations with other similar instruments and scales of extraversion have generally produced significant results.

According to the 1962 Myers-Briggs Indicator Manual, weighting of responses were assigned for responses to reduce bias from social desirability, sex, and omissions. To limit distortion from intercorrelations, each response is scored for one preference index only. The specific items for Form F (except a few experimental items which are not currently used) were selected on the basis of their validity to appeal to theoretically defined personality types. The individual items have also been checked for internal-consistency (Myers, 1962).

There are disagreements about the methodologies used in assessing the validity of the MBTI and its internal properties. The controversy exists from results of studies which have considered continuous scores of four or eight scales. The MBTI manual and a study of the structural properties supported the valid use of type categories without continuous scores (Stricker and Ross, 1964b). From studies with high school and college samples, Stricker and Ross (1964a) concluded the S-N and T-F scales reflect the

postulated dimensions, but they did not find similar evidence for the E-I and J-P scales.

Reliability Split half reliabilities of the instrument for various groups were all above 0.75 except for a group of under-achieving 8th graders and a non-prep 12th grade group. The reliability coefficients for type categories are relatively lower than for continuous scores which Stricker and Ross (1963) found to be in the .70's and low .80's. The same study indicated that the E-I, S-N, and T-F scales were independent of each other, but the J-P scale was moderately related to the S-N and T-F scales.

Student Instructional Rating Report

The Student Instructional Rating Report (SIRR) instrument used in the study is a multidimensional instruction evaluation scale. The SIRR form was developed by researchers on the Michigan State University campus. Since 1967, the SIRR has been revised three times to provide a valid instrument for use in obtaining student ratings of instruction as a means for self-improvement to a faculty member. Student responses to the first twenty items of the SIRR were used in the study. Each item had a five-choice format for student responses: (1) strongly agree with statement; (2) agree

with statement; (3) neither agree nor disagree with statement; (4) disagree with statement; or (5) strongly disagree with statement.

The first twenty (20) specific items were designed to represent five (5) multidimensional categories: Instructor Involvement, Student Interest, Instructor-Student Interaction, Course Demands, and Course Organization. The first three categories were most related to the theoretical basis of the study, but it was decided to include all five categories as a means to report comprehensive findings on each category of the SIRR. The five categories are organized into a Composite Profile for reporting student instructional ratings of a particular class.

Construct validity studies of the SIRR indicated an average correlation of 0.70 for the four items which comprise each of the five categories. The average correlation between the five categories was 0.28. These construct validity results provided evidence to believe different instructors would be rated differently; the four items of each category are measuring essentially the same factor; and there is little overlap among the five categories of the SIRR. Verification of these results are included in the study.

According to Interim Report No. 3 of the SIRR project, the items for the SIRR were selected from a pool of two hundred fifty (250) original items. The final selection of items was made on the basis of faculty and student assessment of items. An item was included in an experimental version if at least 70% of the students and 70% of the faculty indicated: (1) the item could be used

for course improvement (relevant for course appraisal); (2) the item should be included in the evaluation form; and (3) the student was competent to evaluate that aspect of the course (Berger and Cohen, 1968).

An experimental version of the SIRR was developed in Fall Term, 1967 and used in a pilot study in Winter, 1968. The study was replicated in Summer, 1968 to determine the stability of the factor structure. Factor analysis of the individual items was done in Winter, 1968 and Summer, 1968. Results of the analysis indicated the percent of variance accounted for was 61% and 53% respectively. Each of the category variables displayed a clean structure (Berger and Cohen, 1968). A copy of the Student Instructional Rating Report is included in the Appendix.

## Population of the Study

The population of the study was 326 undergraduate students and faculty members who were enrolled in or teaching courses offered by the Department of Electrical Engineering during the Spring Term, 1969. The study included each section of each course being offered by the department during Spring Term, 1969, except one section of a senior level course which was excluded due to a change of instructors.

A total of thirteen (13) different courses were offered by the Department of Electrical Engineering during Spring Term, 1969.

Seven of the thirteen courses were junior level courses. Four of the junior level courses were single section courses; two courses had three sections; and one course had two sections. The junior level courses were represented by a total of twelve individual classes. Five of the thirteen different courses were senior level courses, each with the following number of sections: Three of the senior level courses were single section courses; one course had three sections; and the other senior course had two sections. There were nine different senior level classes. One course, consisting of two classes, was a required course for Mechanical Engineers. The thirteen courses thus were represented by a total of twenty-two separate classes.

The sample included 279 Electrical and Mechanical Engineering students and nine of the fifteen Electrical Engineering instructors.

What is the distribution of psychological types among the engineering students and faculty in the study? To answer this question, a distribution count of the sixteen specific types is included and the percentile frequency of the types is reported for instructors, for the total number of undergraduate students, and for two subsets of the undergraduate students--Electrical Engineering and Mechanical Engineering students. The resulting frequency percentiles of the student types are compared to the frequency

percentiles of the sixteen types which have been reported previously (Striker and Ross, 1962). Comparisons of type frequency distributions are included to report these descriptive data for students and faculty in the study.

Analysis of psychological type data can generate information regarding the psychological type preferences of junior-senior engineering students and faculty. An awareness of student-faculty psychological types can also be useful in considering student motivation, in analyzing student criticism of the curriculum and instructors, and the general academic relations between students and faculty. The sum value of this kind of information is of greater awareness of the student-faculty population within the College of Engineering, particularly the Department of Electrical Engineering.

## Frequency and Distribution of Psychological Types in Population

After identification of Myers-Briggs Types for undergraduate students and faculty, the frequency of student and faculty types was tabulated. Percentage frequencies were calculated to report the type distribution for students and faculty.

The percentile frequencies of Electrical Engineering faculty types are reported in Table 3-3. Of the fifteen (15) faculty members, six or forty percent (40%) were INTJ or Introverted-Intuitive Types. Two of the faculty members (13%) were ENFP types or Extraverted-

Feeling Types. Seven other types were represented by one faculty member each as indicated in Table 3-3.

The percentile distributions of types in the undergraduate student population were calculated and are also reported in Table 3-3. Relatively high percentages of various Sensing types were found for the Mechanical Engineering students. The percentage of ISTJ type was twenty-seven and six tenths percent (27.6%) as indicated in Table 3-3. The types with second and third highest percentages were ESTJ and ESTP respectively. The lowest percentages were 1.0% for ESFP and INFP.

The percentage distribution for Mechanical Engineering as reported in Table 3-3 was not similar to the percentage distribution of types which was reported in a previous study of male engineering students. The percentage frequencies of the engineering sample studied earlier are also included in Table 3-3. Compared to the percentages reported for the engineering students, the percentage of Mechanical Engineering student types in the study was twice as large or greater in four of the Sensing Types (ISTJ, ISTP, ESTP, and ISFP). For Intuitive Types, the percentage of four types were also twice as large or greater, but the percentage of

Table 3-3 Percentage Frequencies of Electrical Engineering Faculty and Students, Mechanical Engineering Students, Engineering Students from M.I.T., R.P.I., and Cornell.

| Engineering Groups | Percentages for Psychological Types | | | |
|---|---|---|---|---|
| | ISTJ | ISFJ | INFJ | INTJ |
| E.E. Faculty (N=15) | 6.7 | none | 6.7 | 40.0 |
| E.E. Students (N=206) | 12.1 | 5.3 | 2.9 | 12.6 |
| M.E. Students (N=105) | 27.6 | 3.8 | 1.0 | 2.8 |
| Egr. Students* (N=2, 188) | 10.2 | 4.2 | 5.3 | 13.5 |
| | ISTP | ISFP | INFP | INTP |
| E.E. Faculty | none | none | none | 6.7 |
| E.E. Students | 7.3 | 2.4 | 10.2 | 9.2 |
| M.E. Students | 6.7 | 6.7 | 4.8 | 2.8 |
| Egr. Students* | 2.2 | 1.9 | 5.0 | 8.7 |
| | ESTP | ESFP | ENFP | ENTP |
| E.E. Faculty | none | 6.7 | 13.3 | none |
| E.E. Students | 2.9 | 1.4 | 5.3 | 7.3 |
| M.E. Students | 8.6 | 1.0 | 3.8 | 6.7 |
| Egr. Students* | 3.0 | 1.3 | 5.7 | 7.3 |
| | ESTJ | ESFJ | ENFJ | ENTJ |
| E.E. Faculty | 6.7 | none | 6.7 | 6.7 |
| E.E. Students | 6.8 | 2.4 | 1.9 | 9.7 |
| M.E. Students | 10.5 | 4.8 | 4.8 | 3.8 |
| Egr. Students* | 9.0 | 3.3 | 6.1 | 12.9 |

*Engineering students from M.I.T., R.P.I., and Cornell as reported in Myers-Briggs Manual, 1962, Appendix D-5.

Mechanical Engineering student types were lower rather than higher as in the case of the Sensing Types. The other eight types were approximately equal in percentages for both groups of engineering students.

The percentage distribution of Electrical Engineering students in the study were calculated and are reported in Table 3-3. When compared to the percentages for Mechanical Engineering students in Table 3-3, the percentages for Electrical Engineering students represent a shift from Sensing to Intuitive types. In general, the percentage frequencies of Electrical Engineering types were more similar to the engineering population reported in the Myers-Briggs Manual than the Mechanical Engineering students. Among the types for the Electrical Engineering students, the two greatest percentages of types were INTJ and ISTJ (12.6% and 12.1% respectively). The smallest percentage was ESFP (1.4%). The percentage of ESFP students was also one of two lowest percentages for the Mechanical Engineering students.

Table 3-3 was prepared to present a comparative summary of the frequency percentages of undergraduate students and faculty of the study and the results of an earlier study of an engineering sample of freshmen at Cornell, M.I.T., and R.P.I. The two most obvious differences in the percentages were the percentage of INTJ faculty (40.0%) and the percentage of ISTJ Mechanical Engineering students (27.2%). The relatively small percentage of INTJ Mechanical

Engineering students (2.8%) was also revealed. Low percentages were evident for ESFP type in each engineering group.

Analysis of Engineering Student Type Frequencies

In order to obtain empirical data regarding type frequency distribution for the engineering students in the study, the type frequencies were used in an analysis of variance study of frequencies. Four $\chi^2$ tests were also made for reporting data which would describe the engineering students and faculty type distributions.

The factor analysis of variance design was used in an exploratory search for meaningful associations (Hays, 1963) between and among the four preference indices (E-I, S-N, F-T, and J-P) and the type frequencies of the engineering students in the study. The dichotomous nature of the four preferences and the unique 4 x 4 format of the Myers-Briggs Type Table suggested the factorial design for the analysis of the frequencies reported in Table 3-4.

The factorial analysis was not intended for tests of significance, but as a preliminary search in the data for possible meaningful associations within the type frequency distribution. The results of the analysis did suggest several meaningful associations between and among the four indices and the specific type frequencies. One suggested association among three of the preference indices was probably most relevant for the study. The exploratory factorial analysis of type frequencies suggested a meaningful association

Table 3-4 Myers-Briggs Type Table--Frequency and Percentage of Psychological Types for Engineering Students (N=297).

| | | Sensing Types | | Intuitives | |
|---|---|---|---|---|---|
| | | With Thinking | With Feeling | With Feeling | With Thinking |
| Introverts | Judging | ISTJ (54)17.4% | ISFJ (15)4.8% | INFJ (7)2.2% | INTJ (29)9.30% |
| | Perceptive | ISTP (22)7.1% | ISFP (12)3.8% | INFP (26)8.4% | INTP (22)7.1% |
| Extraverts | Perceptive | ESTP (15)4.8% | ESFP (4)1.3% | ENFP (15)4.8% | ENTP (22)7.1% |
| | Judging | ESTJ (25)8.0% | ESFJ (10)3.2% | ENFJ (9)2.9% | ENTJ (24)7.8% |

among E-I, T-F, and P-J preferences in the frequency distribution of engineering student types.

The limitations of the design were recognized. Because the analysis was being used only as a preliminary investigation to suggest related combinations of the various preferences, the identified relatedness of the three preferences is reported. In other words, to consider variance of type frequencies due to any one of the three indices, it was essential to consider the appropriate preference of each index in the suggested association.

The frequencies of the student preference types were also used in four $\chi^2$ tests for significant differences between various sets of engineering students. The distribution of engineering student types in the study (Table 3-4) appeared to be somewhat similar to the reported distribution of a freshman engineering sample at R.P.I., M.I.T., and Cornell (Myers, 1962, p. D-5). The lower percentages

of Sensing-Feeling Types were apparent for both groups of engineering students. To determine if the two groups of engineering students differed significantly in the frequencies of specific student types, a $x^2$ test was used. The observed frequencies of engineering student types in the study and expected frequencies are listed in Table 3-5. The expected frequencies were calculated from engineering student type percentages reported in the 1962 Myers-Briggs Manual (p. D-5).

Table 3-5 Observed and Expected Frequencies of Engineering Student Psychological Types.

| Preference Type | Frequency | | Preference Type | Frequency | |
|---|---|---|---|---|---|
| | Observed | Expected | | Observed | Expected |
| 1. ISTJ | 54 | 32 | 9. ESTP | 15 | 10 |
| 2. ISFJ | 15 | 13 | 10. ESFP* | | |
| 3. INFJ | 7 | 16 | 11. ENFP | 15 | 18 |
| 4. INTJ | 29 | 43 | 12. ENTP | 22 | 23 |
| 5. INTP | 22 | 27 | 13. ENTJ | 24 | 40 |
| 6. INFP | 26 | 15 | 14. ENFJ | 9 | 19 |
| 7. ISFP | 16 | 10 | 15. ESFJ | 10 | 10 |
| 8. ISTP | 22 | 7 | 16. ESTJ | 25 | 28 |
| df = 14<br>$x^2$ = 82.98** | | | | | |

*Combined with ISFP (7) **Significant at .001

There were significant differences in frequency of student preference types between engineering students of the study and a group of engineering students studied previously. As expected the engineering students of the study differed significantly

from the reported distribution of type frequencies for freshman engineering students of M.I.T., R.P.I., and Cornell.

A $x^2$ test was used to test for differences in type frequencies of two different groups of engineering students in the study. Approximately two-thirds of the students in the study were Electrical Engineering majors; Mechanical Engineering students comprised the remaining one-third of the students. The purpose of the $x^2$ test was to provide more information about frequencies of psychological types for Electrical and Mechanical Engineering students in the study.

If all 16 cells of the Myers-Briggs Type Table were included for observed and expected frequencies in a $x^2$ test, the cell frequencies would have been critically low. For this reason, the cells were collapsed across the Sensing-Intuition Index. The choice of Sensing-Intuition Index was based on two conditions: (1) the analysis of variance for type frequencies demonstrated that the other three indices (E-I, T-F, and J-P) were interrelated with each other in terms of frequency distribution of types; (2) observation of the fact that many Mechanical Engineering majors tend to be attracted to management and graduate study in Business where sensing types are abundant. Sensing types seemed to be more frequent for Mechanical Engineering students than for Electrical Engineering students.

A $x^2$ test was calculated to determine if the two groups of engineering students in the study were different in terms of

the frequency of sensing types and intuitive types, and if a greater proportion of the sensing types were Mechanical Engineering students rather than Electrical Engineering students.

The 2 x 2 contingency table for the frequency of sensing and intuitive types for Electrical and Mechanical Engineering students is included as Table 3-6.

Table 3-6 Contingency Table (2 x 2) of Sensing and Intuitive Types for Electrical Engineering and Mechanical Engineering Students

| | Types | | TOTAL |
|---|---|---|---|
| | Sensing | Intuitive | |
| Mechanical Engineers | 73 | 32 | 105 |
| Electrical Engineers | 84 | 122 | 206 |
| TOTAL | 157 | 154 | 311 |
| df = 1 $x^2 = 11.77^*$ | | | |

*Significant at .01

With the $x^2$ value of 11.77 as reported in Table 3-6, it was possible to report significant differences between the two types of engineering majors. The results tended to support the probability that sensing engineering students were more frequent in Mechanical Engineering than in Electrical Engineering.

Because the two groups of Michigan State University engineering students differed in frequencies of psychological types, both groups

were also compared with the group of engineering students from R.P I., M.I.T., and Cornell. A $x^2$ test was used to test for differences in frequencies of types between the groups of Electrical Engineering students and Mechanical Engineering students and the frequencies reported for engineering students in the Myers-Briggs Manual. The observed and expected frequencies for the $x^2$ tests are included in Tables 3-7 and 3-8.

Table 3-7. Observed and Expected Psychological Type Frequencies of Electrical Engineering Students (N=206).

| Preference Type | Frequency | | Preference Type | Frequency | |
|---|---|---|---|---|---|
| | Observed | Expected | | Observed | Expected |
| 1. ISTJ | 29 | 21 | 9. INFJ | 6 | 11 |
| 2. ISTP | 15 | 5 | 10. INFP | 21 | 10 |
| 3. ESTP | 6 | 6 | 11. ENFP | 11 | 12 |
| 4. ESTJ | 14 | 18 | 12. ENFJ | 4 | 13 |
| 5. ISFJ | 16 | 11 | 13. INTJ | 26 | 28 |
| 6. ISFP | ↑ | ↑ | 14. INTP | 19 | 18 |
| 7. ESFP | ↓ | ↓ | 15. ENTP | 15 | 15 |
| 8. ESFJ | 8 | 10 | 16. ENTJ | 20 | 27 |
| df = 13<br>$x^2$ = 49.24* | | | | | |

*Significant at .001

↑↓ Added to adjacent type

Table 3-8 Observed and Expected Frequencies of Psychological Types for Mechanical Engineering Students (N=105).

| Preference Type | Frequency | | Preference Type | Frequency | |
|---|---|---|---|---|---|
| | Observed | Expected | | Observed | Expected |
| 1. ISTJ | 36 | 13 | 9. INFJ | 1 | 5 |
| 2. ISTP | ↑ | ↑ | 10. INFP | 5 | 5 |
| 3. ESTP | ↓ | ↓ | 11. ENFP | 4 | 6 |
| 4. ESTJ | 20 | 12 | 12. ENFJ | 5 | 6 |
| 5. ISFJ | 11 | 6 | 13. INTJ | 3 | 14 |
| 6. ISFP | ↑ | ↑ | 14. INTP | 3 | 9 |
| 7. ESFP | ↓ | ↓ | 15. ENTP | 7 | 8 |
| 8. ESFJ | 6 | 6 | 16. ENTJ | 4 | 13 |
| df = 1<br>$x^2 = 66.99^*$ | | | | | |

*Significant at .001 ↑↓Added to adjacent type

Both $x^2$ test values were larger than the value needed to report significant differences. The reported differences in psychological types were included as an indication of diversity among engineering students in the study.

## Collection of Data

Extensive preparation for the study was necessary during Winter Term, 1969. After the study procedure was formulated, considerable time was consumed in obtaining the necessary approval from appropriate individuals of the College of Engineering, especially the classroom instructors. Due to the confidential nature of the data

being requested and the desire to assure proper cooperation, much time was spent with administrators and faculty in order to personally explain the study to them. The confidential nature of the data and the required amount of classtime for data collection were the two major issues. Prior to the initiation of the study, approval for the study was unanimous among faculty and any apparent reluctance to participate in the study was not evident. In spite of the required access to privatized information, the study was initiated without any serious reluctance from faculty. The attitude of students and instructors in the study did not indicate any source of bias.

Administration of the Myers-Briggs Type Indicator (MBTI) was done during the first week of Spring Term, 1969. The instrument was administered to senior students in each of three sections of a required senior course. Identification of Myers-Briggs Type for the other undergraduate students was accomplished by administering the MBTI in six sections of junior level courses and two classes of Mechanical Engineering students. The Myers-Briggs Types of fifteen faculty members were identified by having instructors complete the Indicator with their classes or at the convenience of the instructor.

By contacting students who were absent when the Myers-Briggs Type Indicator had been given in their classes and requesting them to complete the Indicator, a total of three hundred twenty one (321) student psychological types were identified. The follow-up procedure

failed to obtain type identification for forty students. Of these forty (40) students, thirty-one (31) were Mechanical Engineers and nine (9) were majors in Electrical Engineering.

Description of the sixteen Myers-Briggs Types were prepared from information in the 1962 Myers-Briggs Manual. Each faculty member was given a copy of the appropriate description of his self-reported type. A copy of the appropriate type description was also made available to each student.

The Student Instructional Rating Reports were to be administered at the approximate midpoint of Spring Term, 1969. This schedule could not be maintained because of a delay in the printing of the SIRR forms. The SIRR forms were not available until three weeks before the end of Spring Term, 1969.

An individual who was quite familiar to faculty and students administered the SIRR in each section of every course to insure confidentiality of the information and unbiased responses. Administration of the SIRR form required eight class days.

The SIRR forms were completed by the students during the seventh and eighth week of the term. The students were asked to identify their rating responses after they had made their responses. A brief explanation of the need for identification was given: a student's rating was to be matched with his psychological type. The students did not display any overt reluctance to identify their respones.

A total of 321 students completed the Myers-Briggs Type Indicator. Of this number, twenty-one (21) students did not complete a Student Instructional Rating Report (SIRR). The total number of individual students who completed the Myers-Briggs Type Indicator (MBTI) and at least one SIRR form was 300--206 Electrical Engineering students and 94 Mechanical Engineering students. The total number of SIIR forms completed (including multiple SIRR forms by students enrolled in two or more Electrical Engineering courses) was 832. An SIRR form was not used if it contained two responses for a single item or if a student failed to reply to at least two of the four items for any one of the five categories. After dropping such unusable SIRR forms, a total of 279 students with an identified preference type and one SIRR form were identified as the sample for statistical analysis procedures of the study.

Each Mechanical Engineering student completed only one SIRR, but each Electrical Engineering student completed two or more SIRR's, with only a few exceptions where a student was enrolled in a single Electrical Engineering course. Most Electrical Engineering students completed three SIRR forms due to being enrolled in three required Electrical Engineering courses.

Only one SIRR form for each student in the sample was used. For Electrical Engineering students who had multiple SIRR's, a single SIRR was identified prior to the initiation of data analysis. Of the multiple SIRR's, a single SIRR was selected for

a student so that all courses would be represented. SIRR's by particular student types for various faculty types were selected first because of the unequal distribution of types available in the population. Except for the selection of SIRR's for relatively infrequent types, the selection of a particular SIRR for a given student was essentially by chance.

## Data Analysis and Statistical Design

Structure for the study of the student instructional ratings, was derived from a general hypothesis that student instructional ratings of an instructor are related to the psychological preference types (Myers-Briggs Type) of students and instructors.

The following types of data were available for use in determining if a relationship existed between student instructional ratings and student-instructor psychological types: (1) fifteen (15) faculty members and 310 undergraduate engineering students with identified MBTI psychological types, and (2) a total of 883 individual, but not independent, student instructional ratings as reported by Student Instructional Rating Report (SIRR) forms. To increase the potentiality of various student psychological types completing instructional ratings for as many different instructor types as possible, SIRR forms were completed in every course. This procedure was necessary because it was impossible to accurately predict the variety and frequency of psychological types among the students and instructors.

Frequency counts of the various types were made to determine the frequency percentiles of the specific types for the engineering faculty and for the total number of engineering students in the study. Frequency percentiles were also determined for two student groups (Electrical Engineering students and Mechanical Engineering students) for further analysis of differences in types between students and faculty and between student groups. The analysis of type frequencies among engineering students generated information about engineering students in the study. Results of the analysis are reported in the preceding section.

The Student Instructional Rating Reports were initially hand scored in order to obtain an immediate source of information to give to each instructor. Frequency counts of student responses for each SIRR item were prepared for each class. This information enabled each instructor to be aware of the overall type of student responses and to note any areas or items which were relatively different (higher or lower). These ratings were discussed with the instructors. Only two instructors indicated a specific indication of their feeling that they would attempt to improve ratings which were indicated as relatively weak for them.

The SIRR Froms were also machine-scored for data analysis with the individual item responses also being punched into cards for computer processing. Each student's type was added to the data

card which contained his instructional rating responses.

Mean Student Instructional Ratings

The initial analysis of student responses on the Student Instructional Rating Report (SIRR) was made without reference to the self-reported psychological types of students and instructors. The SIRR responses of 279 students were used to calculate mean student ratings for twenty individual items of the SIRR. Similar mean student instructional ratings were also calculated for five respective categories of the SIRR Composite Profile. Correlations for both types of mean student instructional ratings were calculated to determine the intercorrelation of the individual items of the SIRR form and the specific categories of the SIRR Composite Profile.

Student-Faculty Psychological Types and Student Instructional Ratings

With the anticipation that the data collection techniques would provide an appropriate variety and frequency of psychological types among faculty and students, the general hypothesis of the study was restated in the form of the following predictive hypotheses:

1. There are significant differences in student instructional ratings among students of different psychological types.

2. There are significant differences in student instructional ratings among instructors of different psychological preference types.

3. There are significant differences in student instructional ratings due to the interaction of student and instructor psychological types.

Analysis of variance was selected as the statistical test to determine if the differences among the student instructional ratings were random or related to student-faculty psychological types. The decision to use an analysis of variance model was based on the condition of being able to selectively choose among the multiple student SIRR ratings to establish a set of data for a two way analysis of variance. The two way model would provide necessary results for use in significance testing for a decision on whether there was sufficient evidence to support the hypotheses or not.

A selective, trial and error method was used in identifying the 279 students and three faculty types for the proposed two way analysis of variance test. The limited variety of instructor psychological types made it possible to include only three instructor psychological type categories. The instructor categories were INTJ, ENFP, and ESFP.

Selection of a single student rating for each student was based on two factors. Students with only one SIRR were included before any students with multiple SIRR's. The uneven distribution of student psychological types made certain student types critical. Selection

of a single SIRR for students of these critical types was completed first.

The final stage of the selective, trial and error method was to include a single SIRR for students of more frequent student psychological types until the student type cells were approximately equal among the three instructor type categories and included at least two per cell. As each student's single SIRR response was selected, his name was removed from the pool of available data. In this manner, the independent observations or student responses were selected for the two way analysis model with unequal cells.

Fourteen of the possible sixteen student psychological type categories were included. Insufficient numbers of INFJ and ESFP student types were available to include them as categories. The lack of these two student types was noted for each faculty type. Due to the general absence of these two types in the student population, the types were dropped as categories.

The individual student instructional ratings of the 279 students met the requirement of independence among observations for the analysis of variance test. The observations were considered to be random and independent due to the selective method of identifying the observations. They were mutually independent with a theoretical equal opportunity to occur.

Mean student instructional ratings indicated the variances between student types were not drastically different. The same

kind of data implied an approximately normal distribution for student ratings. No clustering at the extremes were found and the overall mean student ratings displayed central tendencies. The variances between and within sets were independent and consequently additive.

The student instructional ratings for each instructor type included student ratings for more than one instructor of that type. One instructor type was an exception to this pattern. Only one ESFP instructor was present. The type was included because the instructor was teaching two drastically different courses. Both classes were relatively large. One class included senior Electrical Engineering students. The other class included sophomore and junior Mechanical Engineering students. Student instructional ratings were drawn from both classes as if two instructors were involved. It was assumed that this interpretation was within the limits of toleration for satisfying the basic assumptions of the analysis of variation test unless post-hoc comparisons revealed a single major difference between this type and the other two types.

SIRR Categories I-III (dependent variables $x_1$, $x_2$, and $x_3$) were particularly relevant to the hypotheses because of their apparent relationships to the underlying theory of the study. A significance level of .05 was selected as the value for the F tests. The significance level of probability consisted of F values $\leq .05$ with appropriate degress of freedom. Values of F at probability levels of

<.10 and >.05 were considered to be close to significance.

Post-Hoc Comparisons

The Scheffé method was to be used for post-hoc comparisons of mean instructional ratings where significant F test results were obtained. These pair-wise comparisons would identify differences which contributed to overall significant differences in the analysis of variance tests.

Instructor Estimates of Student Instructional Ratings

Self-rating data were obtained from six instructors to determine if an instructor's responses were similar in nature or not with the instructional rating responses from students in his class. Each of six instructors was asked to complete a Student Instructional Rating Report (SIRR) as if he had been a student in his particular class. The self-rated, instructional ratings of the six instructors were scored to correspond with the five categories of the SIRR Composite Profile. The responses by the instructors were then compared to the SIRR Composite Profile mean ratings which had been calculated for the various groups of student psychological types in his class. The six instructors were chosen because their classes were relatively large. The potential for a greater variety of student psychological types and for two or more students of a specific psychological type was maximized in the larger classes.

Student Instructional Ratings for Different Types of Instruction in the Same Class

Two sets of student instructional ratings were compared for one class in which students had experienced two types of instruction from the same instructor. The instructor lectured during the first part of the term. Group discussions were used in the final weeks of the class. The student instructional ratings were obtained at the end of each type of instruction and were compared.

Comparison of Mean Student Instructional Ratings Obtained During the Term and at the End of the Term

Student instructional ratings were obtained in eleven classes at the end of Spring Term, 1969. (Instructors in the other eleven classes objected to a second administration of the SIRR in their classes due to the time factor). The class mean student instructional ratings from the end of the term were compared with the class mean student instructional ratings which had been obtained in the same classes during the term.

Results of the analysis procedure, including statistical tests are described in Chapter IV.

# CHAPTER IV

# RESULTS OF THE STUDY

The results of the data analyses and statistical tests are described in this chapter. Two general types of results are included. The initial results were obtained from analyses of mean Student Instructional Rating Report data without reference to the psychological types of students and faculty. The other results in the chapter were obtained in analyses which included student instructional ratings according to student-faculty psychological types.

## Mean Student Ratings

Responses from 279 Student Instructional Rating Reports (SIRR) were included in a calculation of mean student ratings for each of twenty-one specific statement items of the SIRR. The calculation involved the same student responses which were used for the analysis of variance test. The calculated mean student ratings represented student rating parameters for the department as indicated in Table 4-1.

Student responses to each item of the SIRR ranged from 1 - strongly agree to 5 - strongly disagree. For items 1-12, and

Table 4-1 Mean Student Ratings for Twenty-One Individual Items of Student Instructional Rating Report (N=279).

| SIRR ITEM | MEAN | SIRR ITEM | MEAN | SIRR ITEM | MEAN |
|---|---|---|---|---|---|
| 1 | 1.94 | 9 | 2.60 | 17 | 2.17 |
| 2 | 1.85 | 10 | 2.55 | 18 | 2.30 |
| 3 | 2.51 | 11 | 1.93 | 19 | 2.35 |
| 4 | 2.32 | 12 | 3.01 | 20 | 2.40 |
| 5 | 2.18 | 13 | 2.96 | 21 | 2.83 |
| 6 | 2.08 | 14 | 2.93 | | |
| 7 | 2.05 | 15 | 3.23 | | |
| 8 | 2.16 | 16 | 2.98 | | |

17-20, a lower rating was a more desirable rating. Items 13-16 were related to instructor-course demands and required a different interpretation. A low rating on items 13-16 indicated relative high instructor-course demands (less desirable rating by student).

The lowest or most desirable mean SIRR rating was 1.85 for item No. 2 (the instructor seemed to be interested in teaching). The highest mean rating was 3.01 for item No. 12 (the instructor generally stimulated class discussion). The latter result was not surprising due to the lack of class discussion in engineering classes.

Simple correlations of the mean student ratings for SIRR items were calculated to determine the degree of correlation between items. The correlations were determined because of the experimental nature of the SIRR instrument. The highest correlations were obtained among the specific four items which comprise the separate categories of the SIRR (items 1-4, Category I - Instructor Involvement; items 5-8, Category II - Student Interest; items 9-12, Category III -

Student-Instructor Interaction; items 13-16, Category IV - Course Demands; items 17, 20, Category V - Course Organization. The correlations between item 2 and items 1, 3 and 4 of Category I were .71, .46, and .50 respectively. Similar correlations were obtained for the four items in each of the other four categories.

The correlation of items 1-4 (Instructor Involvement) and items 9-12 (Student-Instructor Interaction) were larger than correlations of items in the other categories. Some correlations of items in Categories I and III (0.30's and 0.40's) were anticipated due to the similarities of Categories I and III. The four items for Instructor Involvement correlated with each other and also with the four items for Student-Instructor Interaction.

The high degree of correlation between the four items of each SIRR Category indicated they were measuring the same factor. Low correlations between items of the different SIRR Categories indicated relatively minor overlap between the categories. The results verified previous correlations which have been reported for the instrument. Due to the size of the correlation tables and the fact that the correlations were similar to those reported for the SIRR, the table of correlations was not included.

The five categories of the SIRR Composite Profile and the respective items which comprise the categories are listed below. (See Appendix for description of SIRR items).

| SIRR Composite Profile Category | SIRR Items |
|---|---|
| I. INSTRUCTOR INVOLVEMENT | 1-4 |
| II. STUDENT INTEREST | 5-8 |
| III. STUDENT-INSTRUCTOR INTERACTION | 9-12 |
| IV. COURSE DEMANDS | 13-16 |
| V. COURSE ORGANIZATION | 17-20 |

Student responses are reported in terms of mean student ratings for the five categories of the SIRR Composite Profile. To generate data which would be compatible with existing efforts to establish normative SIRR data, composite profile ratings were used for data analysis throughout the study, except in the case of mean ratings for individual items reported above.

Mean student ratings for each category of the SIRR composite profile were calculated from the responses of 279 engineering students. Although item 21 of the SIRR is not included in the SIRR composite profile, the mean rating of this item was calculated and reported in Table 4-2.

The lowest mean rating (2.12) was found for Category II Student Interest. The highest mean rating among Categories I, II, III, and V was 2.50 for Category III - Student-Instructor Interaction. The mean student ratings indicated a better rating for the students themselves in terms of interest in learning and attentativeness. The least desirable rating was found for Category III,

Table 4-2 Mean Student Ratings for Composite Profile Categories of Student Instructional Rating Report (SIRR) N=279.

| SIRR Category | Mean Student Rating |
|---|---|
| I. INSTRUCTOR INVOLVEMENT | 2.16 |
| II. STUDENT INTEREST | 2.12 |
| III. STUDENT-INSTRUCTOR INTERACTION | 2.50 |
| IV. COURSE DEMANDS | 3.02 |
| V. COURSE ORGANIZATION | 2.32 |
| SIRR ITEM 21 (enjoyed going to class) | 2.83 |

the interaction of students and faculty. The rating for Category IV indicated general student satisfaction with course demands.

The mean student ratings of Table 4-2 were used to determine the correlation between the five categories of the SIRR Composite Profile, SIRR Item 21, and the grades which students received in the courses which they rated. The resulting correlations among SIRR Composite Profile Categories are indicated in Table 4-3.

Table 4-3 Correlation Matrix of Student Instructional Rating Report Categories of Composite Profile.

| SIRR Categories | Correlations | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| I. Instructor Involvement | -- | | | | |
| II. Student Interest | 0.31 | -- | | | |
| III. Student-Instructor Interaction | 0.57 | .22 | -- | | |
| IV. Course Demands | -0.19 | -0.19 | -0.21 | -- | |
| V. Course Organization | 0.49 | 0.36 | 0.30 | -0.38 | -- |

The correlations of Table 4-3 indicated the correlation of Category I was 0.57, 0.49, and .31 for Categories III (Student-Instructor Interaction), Category V (Course Organization), and Category II (Student Interest) respectively. The positive correlations between Categories I-II and Categories I-III were not surprising due to their common emphasis on the instructor and the student. The correlations between Category IV and each of the other four SIRR categories were negative and relatively low. In general, the correlations of Table 4-3 revealed relatively low and negative correlations between the categories of the SIRR Composite Profile. There were relatively high correlations between Categories I and III and Categories I and V.

Additional correlations were calculated between three other factors and the SIRR Composite Profile Categories. SIRR item 21 (you generally enjoyed going to class), the grade received in the course rated by the student, and grade point averages were used to determine the degree of correlation for each of these three factors with each of the SIIR Composite Profile Categories. The resulting correlations were compiled and are reported in Table 4-4. The correlations between SIRR Item 21 and SIRR Composite Categories I. II, III, and V were relatively high. The students' ratings of Item 21, which referred to a student's attitude toward going to class, tended to be related to his ratings in each of the SIRR Composite Profile except Category IV in which case the correlation was also negative.

Table 4-4 Correlation of SIRR Item 21, Grade Point Average, and Course Grade with SIRR Composite Profile Categories.

| SIRR Categories | Factors Correlated With SIRR Categories | | |
|---|---|---|---|
| | SIRR Item 21 | G.P.A. | Course Grade |
| I | 0.53 | 0.17 | -0.03 |
| II | 0.63 | -0.01 | -0.07 |
| III | 0.40 | 0.16 | -0.05 |
| IV | -0.21 | -0.10 | -0.06 |
| V | 0.51 | 0.17 | -0.02 |

Correlations for course grade and grade point average with each SIRR Composite Profile Category were low in every case. A majority of the correlations were negative. The correlations for course grade and grade point average in Table 4-4 were similar to results of other studies which found low degrees of correlation and no relationships between student grades and the instructional ratings by students. The correlations varied from 0.17 to -0.07.

Analysis of Variance

Calculations for a two way analysis of variance were computed for each of the five categories of the SIRR Composite Profile. Each Category (I-V) was a dependent variable for the analysis to test the predictive hypotheses of the study. Five analysis of variance tables resulted from the calculations of the data. Dependent variables $x_1$, $x_2$, $x_3$ were most relevant to the study's theory of psychological behaviors.

Table 4-5 Analysis of Variance Table for Dependent Variable $X_1$ (SIRR Category I - Instructor Involvement).

| Source | Sum of Squares | Df | Mean Squares | F Ratio | Sig. |
|---|---|---|---|---|---|
| A. Student types | 11.041 | 13 | 0.849 | 2.07 | 0.017* |
| B. Instructor types | 14.519 | 3 | 4.840 | 11.813 | <.0005* |
| C. Interaction of A-B | 18.148 | 39 | 0.465 | 1.1358 | 0.280 |
| D. Error | 90.955 | 222 | 0.409 | | |

*Significant -.05 stated level of probability

Table 4-6 Analysis of Variance Table for Dependent Variable $X_2$ (SIRR Category II - Student Interest).

| Source | Sum of Squares | Df | Mean Squares | F Ratio | Sig. |
|---|---|---|---|---|---|
| A. Student types | 10.703 | 13 | 0.823 | 1.615 | 0.082 |
| B. Instructor types | 3.574 | 3 | 1.192 | 2.339 | 0.074 |
| C. Interaction of A-B | 17.550 | 39 | 0.450 | 0.883 | 0.670 |
| D. Error | 113.117 | 222 | 0.510 | | |

Table 4-7 Analysis of Variance Table for Dependent Variable $X_3$ (SIRR Category III - Student-Instructor Interaction).

| Source | Sum of Squares | Df | Mean Squares | F Ratio | Sig. |
|---|---|---|---|---|---|
| A. Student types | 8.694 | 13 | 0.669 | 1.434 | 0.145 |
| B. Instructor types | 9.866 | 3 | 3.289 | 7.053 | <.0005* |
| C. Interaction of A-B | 18.633 | 39 | 0.478 | 1.025 | 0.438 |
| D. Error | 103.511 | 222 | 0.466 | | |

*Significant -.05 stated level of probability.

Table 4-8 Analysis of Variance Table for Dependent Variable $X_4$ (SIRR Category IV - Course Demands).

| Source | Sum of Squares | Df | Mean Squares | F Ratio | Sig. |
|---|---|---|---|---|---|
| A. Student types | 3.621 | 13 | 0.278 | 0.440 | 0.953 |
| B. Instructor types | 2.225 | 3 | 0.742 | 1.172 | 0.321 |
| C. Interaction of A-B | 15.836 | 39 | 0.406 | 0.642 | 0.951 |
| D. Error | 140.463 | 222 | 0.633 | | |

Table 4-9 Analysis of Variance Table for Dependent Variable $X_5$ (SIRR Category V - Course Organization).

| Source | Sum of Squares | Df | Mean Squares | F Ratio | Sig. |
|---|---|---|---|---|---|
| A. Student types | 13.905 | 13 | 1.070 | 1.5033 | 0.117 |
| B. Instructor types | 7.731 | 3 | 2.577 | 3.622 | 0.140 |
| C. Interaction of A-B | 31.054 | 39 | 0.796 | 1.119 | 0.301 |
| D. Error | 157.958 | 222 | 0.712 | | |

Examination of the probability levels in the analysis of variance tables provided a basis for several decisions regarding the predictive hypotheses. The total number of significant differences at a level of .05 or less in the analysis of variance tables was three out of a total of fifteen calculated differences. None of the five values for interaction were significant, so the existence of significant interaction was concluded as non-existent.

*Categories: I-Instructor Involvement, II-Student Interest, III-Student-Instructor Interaction, IV-Course Demands, V-Course Organization.

Three of ten calculated F values for the main effects (student types and instructor types) were significant. A fourth F value was close to significance. These four F values were obtained in the calculations for variables $x_1$, $x_2$, and $x_3$ which were most related to the study. Due to the three F values for the main effects in Categories I, II, and III (a total of six values) the following considerations were made regarding the hypotheses of the study.

For the main effect, Student Types, the F values for Categories I, II, and III were 0.017, 0.082, and 0.145 respectively (Tables 4-5, 4-6, and 4-7). The F value of 0.017 (Table 4-5) for differences in student ratings of Instructor Involvement (SIRR Category I) among student psychological types was considerably less than the stated level of .05. The F value of 0.082 (Table 4-7) for differences in student ratings for Student Interest (SIRR Category II) among student types was greater than the stated level of .05, but within the stated range for being considered close to significance. The F value for differences in student ratings of Student Instructor Interaction (SIRR Category III) was 0.145 (Table 4-7) or greater than the level for being considered close to significance. It was decided that the F values for differences among student psychological types were lacking sufficient significance to support the first hypothesis. The evidence was insufficient to suggest that the differences in student ratings were more than chance differences among the student types.

For SIRR Categories I, II, and III, the F values for the main effects (Instructor Types) were <0.005, 0.074 and <0.005 respectively. The F values are listed in Tables 4-5, 4-6, and 4-7. With two F values of differences at levels of <.0005 and a third value (.074) in the range to be considered close to significance, there were results which supported the hypothesis of a relationship between student instructional ratings and instructor psychological types, in the case of SIRR Categories I, II, and III which seemed to be most related to the theory of the study.

Post-Hoc Comparisons

Due to the significant F test results from the analysis of variance calculations, the Scheffé method for post-hoc comparisons was used with a stated .05 level of probability. The comparisons were attempted to identify differences in student ratings which contributed to the overall significance of F among instructor psychological types for the categories of Instructor Involvement and Student-Instructor Interaction.

The pair-wise differences between mean student instructional ratings for instructor types were obtained and are reported in Table 4-10.

The 95 percent confidence interval for each of the three possible comparisons was calculated as: $\psi - 0.306 \leq \psi \leq +0.306$. Two of the differences in Table 4-10 were large enough to exclude zero from

Table 4-10 Differences Between Instructional Rating Means of Instructor Psychological Types (SIRR Category I - Instructor Involvement).

| Instructor Types | Mean Rating | Instructor Type Pair-Wise Mean Differences | |
|---|---|---|---|
| A. INTJ | 1.973 | (A-B) -0.183 | (A-C) -0.650 |
| B. ESFP | 2.156 | | (B-C) -0.467 |
| C. ENFP | 2.623 | | |

the calculated interval (-0.650 and -0.467). The third difference (-0.183) between INTJ type instructors and ESFP type instructors was not sufficient to exclude zero in the confidence interval. It was concluded that the differences between INTJ and ENFP types and between ESFP and ENFP types of instructors contributed to the significant F test. They were significant beyond the .05 level. The difference between INTJ and ESFP instructors did not contribute to the significant F test for Category I, Instructor Involvement.

The confidence interval for a similar comparison between INTJ instructor types and combined ESFP-ENFP instructor types was:

$$0.357 - 0.280 \leq \psi \leq 0.357 + 0.280$$

for Instructor Involvement. The interval did not include zero and was also significant at the .05 level.

Post-hoc comparisons were also made for the significant F test which resulted for Category III - Student-Instructor Interaction among instructor types. The differences between means for the comparisons were included in Table 4-11.

Table 4-11 Differences Between Instructional Rating Means of Instructor Psychological Types (SIRR Category III - Student-Instructor Interaction)

| Instructor Types | Mean Rating | Instructor Type Pair-Wise Mean Differences | |
|---|---|---|---|
| A. INTJ | 2.367 | (A-B) -0.365 | (A-C) -0.419 |
| B. ESFP | 2.732 | | (B-C) -0.540 |
| C. ENFP | 2.786 | | |

With a calculated 95 percent confidence interval of

$$\psi - 0.325 \leq \psi \leq \psi + 0.325$$

it was possible to conclude that each of the three differences (-0.365, -0.419, and -0.540) in Table 4-11 were sufficiently large enough to exclude zero from the confidence level. Each of the three pair-wise comparisons contributed to the overall significant F test.

The comparison between the INTJ type instructor's mean rating and the combined mean ratings of ESFP and ENFP type instructors was significant at the .05 level as demonstrated by the following confidence interval of

$$0.359 - 0.280 \leq \psi \leq 0.359 + 0.280.$$

The results of the post-hoc comparisons made it possible to identify several differences among student ratings of instructor preference types which contributed to the significant F test results. Inspection of the data and the post-hoc comparison results were appropriate to make a cautious conclusion of lower or more desirable ratings for INTJ type instructors than for ENFP or ESFP types.

Among the three instructor types, the ENFP type instructor received the highest or least desirable student ratings in both sets of post-hoc comparisons (Tables 4-10 and 4-11). In the first set of comparisons, the student rating for ESFP type was higher, but not significantly different from the INTJ ratings by students. The second set of comparisons revealed significantly different ratings for each instructor type. The student instructional ratings were significantly different between ESFP-ENFP, ESFP-INTJ, and ENFP-INTJ instructor types, with ENFP types being rated highest or least desirable.

Descriptive Analysis

Self-estimated instructional mean ratings by instructors were compared with the most similar mean ratings by students in each of six classes. The instructors generally volunteered to state that their self-ratings tended to reflect their perceptions of students' average opinions of the courses and instruction. The instructors' self-ratings and the most similar mean student ratings are listed in Table 4-12 according to means for the five categories of the SIRR

Table 4-12 Self-Rated Means by Instructors and Most Similar Mean Student Ratings by Student Types in the Classes.

| SIRR Composite Profile Categories | Class Mean | Self Rated Mean | Most Similar Mean Student Rating | | |
|---|---|---|---|---|---|
| | | | Student Mean Rating | Psych. Type | No. of Students |
| **A. INSTRUCTOR - INTJ** | | | | | |
| I. Instructor Involvement | 1.74 | 2.00 | 1.96 | INFP | 6 |
| II. Student Interest | 2.06 | 1.50 | 1.71 | ENTJ | 6 |
| III. Student-Instr. Interact | 2.37 | 2.75 | 2.87 | INFJ | 2 |
| IV. Course Demands | 2.77 | 2.75 | 2.65 | ISTJ | 5 |
| V. Course Organization | 1.54 | 1.50 | 1.50 | INFP | 6 |
| **B. INSTRUCTOR - INTJ** | | | | | |
| I. Instructor Involvement | 2.11 | 2.00 | 2.00 | ISTP | 3 |
| II. Student Interest | 1.67 | 2.00 | 1.75 | ISTP | 3 |
| III. Student-Instr. Interact | 3.01 | 1.25 | 2.50 | ENTP | 2 |
| IV. Course Demands | 2.67 | 1.75 | 2.17 | ISTJ | 3 |
| V. Course Organization | 2.69 | 2.50 | 2.50 | INTJ | 4 |
| **C. INSTRUCTOR - INTJ** | | | | | |
| I. Instructor Involvement | 1.31 | 1.50 | 1.50 | ISTJ | 3 |
| II. Student Interest | 1.59 | 1.75 | 1.75 | ENFP | 3 |
| III. Student-Instr. Interact | 1.57 | 1.75 | 1.83 | ENFP | 3 |
| IV. Course Demands | 4.03 | 3.00 | 3.75 | INTJ | 2 |
| V. Course Organization | 1.67 | 1.75 | 1.75 | INTJ-ESFJ | 2-2 |
| **D. INSTRUCTOR - ENFP** | | | | | |
| I. Instructor Involvement | 2.71 | 1.50 | 2.37 | INTJ | 2 |
| II. Student Interest | 1.98 | 2.00 | 2.00 | ISFJ-INTJ | 4-2 |
| III. Student-Instr. Interact | 2.74 | 1.75 | 2.37 | INTJ | 2 |
| IV. Course Demands | 3.32 | 2.75 | 2.75 | ESFP | 3 |
| V. Course Organization | 2.40 | 4.00 | 3.00 | ESFP | 3 |
| **E. INSTRUCTOR - ESFP** | | | | | |
| I. Instructor Involvement | 1.82 | 1.25 | 1.50 | ISTP | 3 |
| II. Student Interest | 1.93 | 2.00 | 2.08 | ISTP | 3 |
| III. Student-Instr. Interact | 2.09 | 2.00 | 1.50 | ISTP-INFP | 3-5 |
| IV. Course Demands | 3.21 | 4.25 | 4.06 | ENTJ | 6 |
| V. Course Organization | 2.65 | 1.75 | 2.37 | ISFJ | 2 |

Table 4-12 (Continued)

| SIRR Composite Profile Categories | Class Mean | Self Rated Mean | Most Similar Mean Student Rating | | |
|---|---|---|---|---|---|
| | | | Student Mean Rating | Psych. Type | No. of Students |
| F. INSTRUCTOR - ENFJ | | | | | |
| I. Instructor Involvement | 2.19 | 2.25 | 2.25 | ISTJ- | 2 |
| | | | | ENTP- | 2 |
| | | | | ENTJ | 4 |
| II. Student Interest | 1.69 | 2.00 | 2.00 | INFJ | 2 |
| III. Student-Instr. Interact | 2.88 | 2.50 | 2.62 | ENTJ | 4 |
| IV. Course Demands | 3.17 | 2.50 | 2.37 | ESTJ | 2 |
| V. Course Organization | 2.63 | 3.50 | 3.33 | ISFJ | 3 |

Composite Profile. No general conclusions were obvious from the examination of data reported in Table 4-12. The following observations were noted in the comparison of instructor psychological types with student types whose ratings were most similar to the instructor's self rating. For instructor INTJ (A) three of the most similar ratings were by INF type of students. Four of the five most similar ratings were by intuitive students. For the second INTJ instructor (B) three of the five most similar student ratings were by IST student types.

In the case of the third INTJ instructor (C) two of the most similar student ratings were by students who were equal in type (INTJ). The main observation was that intuitive types were dominant as in the case of the first INTJ instructor.

Two student types had the same most similar rating in a category for the ENFP instructor. Within the six student psychological

types, a complete division on the first three indices was obvious. Each preference of the E-I, S-N, and F-T preference indices was represented three times. For the J-P index, the division was in favor of J.

The ratings by sensing types were dominant for the ESFP instructor followed by introversion, thinking, and perception. Sensing and perception preferences were equal to the instructor's type.

The most obvious observation for the ENFJ instructor was the almost complete set of J preferences for the student types. No other patterns were revealed.

The instructor's overall class ratings were also included in Table 4-13 for comparisons with the instructor's self ratings. In general, the self ratings by judging type instructors tended to be closer to the overall class mean ratings than the perceptive type instructors, especially for Category I, Instructor Involvement. The greatest variations between instructor self-ratings and class mean ratings were in Category IV (Course Demands) and Category V (Course Organization).

The responses of student instructional ratings (by student psychological types) for two types of instruction (lecture and discussion) from the same instructor were compared to determine if various student psychological types would change their instructional ratings. From the comparative data, it was possible to report

every student type, except one, rated the lecture segment of the class lower or better for SIRR Category I (Instructor Involvement). The ratings by INTP students were lower (.06 lower) for the discussion segment of the class. Category III (Student-Instructor Interaction) was similar. The ratings by every student psychological type for the two types of instruction were either equal or lower for the lecture segment in Category III.

For Category II (Student Interest), student types ISTJ, INTP, INFP, and ENTP favored the discussion segment with lower ratings. Student types ISFJ, INTJ, ISTP, and ENTJ rated the lecture segment lower or more desirable.

Lower student ratings for the discussion segment of the class were indicated in Category IV (Course Demands) by ISTJ, ISFJ, INTJ, INFP, ENTP, and ENTJ student types. These ratings indicated these six student types perceived the demands of the course as higher during the discussion segment. Two student types (INTP and ISTP) indicated the lecture portion was more demanding by their lower ratings.

Category V (Course Organization) had lower ratings for the lecture portion by student types INTJ, INFP, ENTP, and ENFP. The ISFJ, INTP, and ISTP student types rated the discussion portion lower or more desirable. Ratings for the two instructional techniques were equal for ISTJ student types.

Two sets of student instructional ratings for eleven classes were compared to study the class mean student ratings which were obtained during and at the end of Spring Term, 1969. The two sets of student ratings for eleven classes were compiled into the five categories of the SIRR Composite Profile and are reported in Table 4-13.

It was possible to note the following results from the two sets of student ratings. The second or final student ratings were lower or better in eight of eleven classes for SIRR Category I- (Instructor Involvement). Higher ratings (indicating less instructor involvement) at the end of the term were indicated for two ENFP type instructors. The same patterns of higher and lower ratings were evident for Category II (Student Interest) and Category III (Student-Instructor Interaction). For Category IV (Course Demands) higher end of term student ratings (less demanding) were noted for ENFP and ESFP type instructors. The other nine classes received lower student ratings (more demanding) at the end of the term. Higher ratings at the end of the term for Category V (Course Organization) were given to ENTJ and ESTJ type instructors as well as both ENFP type instructors. The examination of the changes in student instructional ratings between ratings during the term and ratings at the end of the term also revealed consistently lower or equal ratings at the end of the term for each of the four classes with an INTJ type instructor. All changes to higher or less desirous ratings in the two sets of student ratings occurred in classes with extraverted types of instructors.

Table 4-13 Class Mean Student Ratings for Eleven Classes.

| Instructor Type | Rating | SIRR Category | | | | | Class Size |
|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | |
| 1. INTJ | 1st | 1.60 | 1.82 | 2.12 | 3.48 | 1.58 | 20 |
| | 2nd | 1.27 | 1.61 | 1.76 | 2.29 | 1.46 | |
| 2. INTJ[1] | 1st | 1.84 | 1.98 | 2.45 | 3.66 | 2.43 | 11 |
| | 2nd | 1.79 | 1.52 | 2.30 | 3.50 | 1.93 | |
| 3. INTJ[1] | 1st | 2.89 | 2.00 | 2.98 | 3.12 | 2.34 | 36 |
| | 2nd | 2.87* | 1.87 | 2.95* | 3.01 | 2.30* | |
| 4. INTJ | 1st | 1.31 | 1.59 | 1.59 | 4.03 | 1.67 | 29 |
| | 2nd | 1.30* | 1.53 | 1.48 | 3.74 | 1.63* | |
| 5. ENTJ | 1st | 1.80 | 2.12 | 2.54 | 3.58 | 2.14 | 16 |
| | 2nd | 1.98(+) | 2.37(+) | 2.46 | 3.40 | 2.22(+) | |
| 6. ISTJ | 1st | 1.61 | 1.59 | 1.89 | 2.78 | 1.98 | 18 |
| | 2nd | 1.48 | 1.60* | 1.72 | 2.54 | 1.94* | |
| 7. ESTJ | 1st | 1.76 | 2.11 | 2.40 | 2.82 | 1.63 | 22 |
| | 2nd | 1.57 | 1.74 | 2.21 | 2.44 | 1.70(+) | |
| 8. ENFP[2] | 1st | 1.95 | 1.86 | 2.71 | 3.56 | 2.52 | 13 |
| | 2nd | 2.19(+) | 1.69 | 2.88 | 3.17 | 2.63(+) | |
| 9. ENFP[2] | 1st | 2.31 | 1.92 | 2.86 | 3.08 | 3.07 | 25 |
| | 2nd | 1.96 | 1.79 | 2.71 | 3.18(+) | 2.85 | |
| 10. ENFP | 1st | 1.68 | 1.84 | 1.70 | 3.59 | 2.54 | 23 |
| | 2nd | 2.11(+) | 2.05(+) | 2.07 | 3.25 | 2.90(+) | |
| 11. ESFP | 1st | 2.16 | 2.02 | 2.85 | 3.02 | 2.30 | 65 |
| | 2nd | 1.78 | 2.00* | 2.47 | 3.19(+) | 2.15 | |

Note - 1st rating during term; 2nd rating at end of term.

[1]Two classes - Same instructor

[2]Two classes - Same instructor

(+) End of term rating higher than rating during the term.

*Ratings considered equal unless difference >.05.

A summary of the study and discussion of the results is presented in Chapter V.

# CHAPTER V

## SUMMARY AND DISCUSSION

The purpose of the study was to determine if undergraduate student instructional ratings as measured by Student Instructional Rating Reports were related to Myers-Briggs psychological types of students and instructors.

The study of student instructional ratings was prompted by current issues regarding the inefficiency of undergraduate instruction, the requests by students for a voice in evaluating instruction, and the availability of two relatively new instruments which could be used together for a study of student instructional ratings in terms of student-faculty psychological types.

Evaluation of instructors and specific courses always takes place among students officially or unofficially. The need for controlled student evaluation of instruction is advocated as a means for improving undergraduate instruction. Many colleges and universities are implementing programs of student instructional evaluation. Student evaluations are the most valid source of data regarding students' opinions of their classroom experiences.

Students often differ in their opinions of an instructor of a particular course. The differences in student opinions of instruction might be related to commonalities and differences in the combinations of psychological behaviors which make up the personalities of students and instructors. Student instructional ratings should reflect the differences in attitudes, values, and activities between students and an instructor. The study was initiated to determine if student-faculty psychological preference types are related to student instructional ratings.

Student instructional ratings have been studied extensively in terms of a wide variety of variables. Studies have found little or no relationship between student ratings and grades, class size, instructional method, and class level. Student ratings did not correlate with such factors as sex, age, grade level, major area, or grades previously received. Instructor and student characteristics have also been used in studies of student ratings with uncertain and often conflicting results. The present study examined student ratings in terms of psychological behavior preferences of students and their instructors.

The study involved undergraduate engineering students and faculty who were enrolled in or teaching courses offered by the Department of Electrical Engineering at Michigan State University during Spring Term, 1969. The Myers-Briggs Type Indicator was used to identify psychological types of 311 undergraduates and 15

faculty members. Students completed the Myers-Briggs Type Indicator in class.

Approval and cooperation for the study required much personal assurances of the confidential and ethical use of the data. Psychological types of faculty and students were identified at the beginning of Spring Term, 1969. Student Instructional Rating Reports were completed by students in each class during the term and each student identified his Student Instructional Rating Report. At the end of the term, student ratings were obtained in eleven of the same classes, but students did not identify these ratings.

Frequency percentiles of student and faculty types were calculated for descriptive data of students and faculty in the study and for analyses to test for differences between the engineering students of the student and another engineering sample.

The instruments used in the research were: (1) Myers-Briggs Type Indicator, and (2) Student Instructional Rating Report. Both instruments are relatively new experimental instruments which have been developed by research efforts. Research reports indicated their potential for use in the study of student instructional ratings.

Analysis of the data consisted of descriptive and statistical data analysis procedures. Mean student ratings were calculated

for twenty (20) individual items of the Student Instructional Rating Report (SIRR). Mean student ratings were also calculated for five categories of the SIRR Composite Profile. Correlations for each of the two types of mean student ratings were calculated. These data were analyzed without reference to the student-faculty psychological types.

To determine if instructional ratings of the engineering students were related to the student-faculty psychological types, an analysis of variance model was used to test for significant differences in the student ratings among student psychological types and among faculty types. A .05 level of probability was chosen for F tests of significance for differences which would tend to support the predictive hypotheses stated in the study. Post-hoc comparisons were made with Scheffé method to examine the pair-wise comparisons of student instructional ratings for the different instructor types.

Self-estimated instructional ratings by six instructors were compared with student ratings of the classes to determine which student psychological types had given the most similar ratings. Two sets of student ratings from one class were compared to study the changes in student ratings for two types of instruction from the same instructor. Student ratings obtained during the term and at the end of the term for eleven classes were analyzed for patterns and changes in student ratings from the first to the second set of student ratings.

The results of the various data analyses provided descriptive and statistical results. Mean student instructional ratings for individual SIRR items ranged from a low of 1.85 to a high of 3.01 on a 1-5 scale (a lower rating was a better rating except for items dealing with course-instructor demands). Correlations between the individual SIRR items indicated relatively high degrees of correlation among each of the four items which comprised a category of the SIRR Composite Profile. The intercorrelations among the five categories were generally low indicating little overlap between the SIRR Composite Profile categories. The lowest or best student rating was 2.12 for SIRR Category II, Student Interest; the highest or least desirable mean rating was 2.50 for SIRR Category III, Student-Instructor Interaction. Correlations between SIRR Composite Profile category means were low except for categories I-III and Categories I-IV. Correlations between course grades and grade point averages with each category of the SIRR Composite Profile were low in every case.

Only one of three predictive hypotheses was supported by the results of a two-way analysis of variance test. Student-faculty type interaction was not revealed. The data did not support a relationship between student ratings and student psychological types. Differences in student instructional ratings among instructor psychological types were beyond the .05 level of probability for three of the SIRR Composite Profile Categories which were especially relevant

to the theory of the study. These results provided a basis for supporting the second hypothesis of student ratings being related to psychological types of instructors. Post-hoc comparisons revealed two of three pair-wise comparisons were sufficiently large to provide significance in one test; in a second test, all three pair-wise comparisons between instructor types were sufficiently large to contribute to the overall significant difference among instructor psychological types.

The comparison of instructional self-ratings and the most similar student ratings did not reveal any general conclusions, although a few preference patterns of student-faculty types were apparent. Judging type instructors tended to be closer to the actual student ratings than perceptive type instructors. In general, the results of the comparison tended to be similar to Taylor's study (1968) which reported no correlation between class observation scores and MBTI types among students and instructors.

Results of a comparison of student instructional ratings of lecture and discussion types of instruction with the same instructor revealed a lower or better rating for the lecture, by all student types, except one, when instructor involvement was rated. All student types rated the lecture better for Student-Instructor Interaction.

Student instructional ratings were obtained during the term and at the end of the term in eleven classes. A comparison of the two sets of instructional ratings by students revealed that a majority

of instructors received lower or better ratings at the end of the term. Students also tended to indicate the course demands were lower at the end of the term. All changes to higher or less desirous ratings at the end of the term were found in classes with extraverted types of instructors.

## Discussion

The study was an exploratory investigation of student instructional ratings according to student-instructor psychological Myers-Briggs types. For electrical and mechanical engineering students in the study, significantly different student ratings were found for Instructor Involvement and Student-Instructor Interaction among three instructor psychological types (INTJ, ENFP, and ESFP). Differences in student ratings were close to significance for the category of Student Interest. Because of the significantly different student ratings in two of the three categories most related to the theory of the study, the results of the study tended to provide tentative support for the predictive hypothesis of a relationship between student ratings and instructor psychological types.

Post-hoc comparisons of the mean student ratings revealed that the significant differences were due to the lower or better student ratings which were reported for INTJ instructor type. Based on the data from the study, there was no doubt that the instructor

type INTJ received the lowest (most favorable) ratings from engineering students. Besides the significantly lower ratings for Instructor Involvement and Student-Instructor Interaction, student ratings were also lower (more favorable) in other student rating categories for INTJ instructor type.

Similar favorable results for INTJ instructors were found when student ratings of individual classes were examined. Student ratings in each of four classes with INTJ instructors decreased or improved from a rating during the term to a second rating at the end of the term. All changes to higher or less favorable student ratings between the two sets of student ratings were found for classes with extraverted types of instructors (ESTJ, ESFP, and ENFP-2 instructors).

If student ratings by engineering students were assumed to be valid evaluations of teaching competence, it should be possible to improve undergraduate engineering instruction by filling all instruction positions with INTJ type instructors. If all engineering instructors were INTJ types, engineering student ratings would probably indicate improved instruction by more favorable student instructional ratings. However, the study did not indicate student ratings were a valid evaluation of teaching competence. The results of the study did not indicate the degree to which student ratings were a measure of general teaching competence or quality of instruction, but indications of student reaction. Because of the indicated relationship between student

instructional ratings and instructor psychological type, the use of student ratings as a single measure of teaching competence was considered to be invalid.

There was no statistical evidence to support the existence of a predicted relationship between student ratings and student psychological types. Several conditions were considered as possible reasons for the absence of the predicted relationship. The variety of psychological types was limited among the engineering students and faculty. Two student types (INFJ and ESFP) were not available for inclusion as student type categories. The limited number of certain student psychological types was indicated in the descriptive analysis of the frequency distribution of the engineering students. The shortage of various student types and the fact that all students were taking required engineering courses were also possible reasons for the lack of differences in student ratings among student types. The limited number of instructor types plus the high percentage of INTJ type instructors were also possible factors which might have influenced the obtained results.

The lack of interaction between psychological types of students and psychological types of instructors was also noted. There was no indication of favorable or unfavorable ratings if student and instructor types were relatively congruent or opposite. The shortage of certain student types might have affected the results as suggested above. One of the missing student types (ESFP) was the congruent student type

for ESFP instructor type. ESFP type was also the opposite type for INTJ instructor type. The absence of this missing student type was considered as a possible influence for the lack of interaction, although interaction, if it existed, should have theoretically been revealed from type categories which were most similar to ESFP.

Another factor was considered as a probable factor in the lack of differences among student types and the lack of interaction. The student rating responses indicated a kind of halo effect of engineering student norms of engineering student approval for the INTJ engineering instructor type. The lack of interaction indicated the student ratings were not related to particular combinations of student and instructor types. The high percentages of INTJ types among students and instructors was noted throughout the study, but the effects of these dominant or modal types for student and instructors could not be specifically identified in the study. Consideration of the various types of data analyses in the study led to the speculation that student ratings might be reflecting the same socio-psychological factors which influenced the students' decisions to choose engineering as a major. This speculation suggested the possibility of designing a similar study which involved students from several majors to test the hypothesis that student ratings would be most favorable for modal instructor types of various academic areas.

Due to the small number of instructor types and the high percentage of INTJ instructors in the study, the extent to which the

results of the study can be generalized to other groups of student and faculty was limited. The study did suggest tentative results which warranted a more comprehensive study, including a more heterogeneous sample of students and faculty. By increasing the variety of instructor types and including individuals from several academic areas, the obtained results would be more conclusive.

Consideration of the data from the study provided other related conclusions. As indicated earlier, a halo effect was suggested from the existing dominance of thinking types among engineering students and faculty. McKeachie (1959) concluded that halo effect (although not isolated) apparently does not invalidate ratings and students discriminate reliably between different instructors and courses. The results of the study did not indicate that student ratings were invalid, but validity for assessing teaching competence might be decreased from a halo effect. The possible influence of a halo effect from the dominant or modal psychological types within a given academic area such as electrical engineering was suggested and should be considered if student ratings for individual instructors are compared. The evidence of most favorable student ratings for modal instructor type suggested that such comparisons should not be made until more data is available for student ratings of modal types in other nonengineering areas of higher education.

Collectively, the INTJ type instructors received the best student ratings. Student ratings for individual INTJ type instructors

did vary however. Mean student ratings were calculated from student ratings of all instructors. Comparison of student ratings for individual INTJ instructors with the overall mean student ratings indicated that students differentiated among the INTJ instructors, although students rated INTJ type most favorably. The overall mean student rating for SIRR Category I-Instructor Involvement was 2.16. The mean student ratings for the individual INTJ instructors varied from the most favorable rating of 1.31 to a less favorable rating of 2.54. Similar variations among INTJ type instructors were found for the other four SIRR Categories. Four of the INTJ instructors were rated consistently lower or better than the overall mean student ratings. Two other INTJ instructors were rated higher or less favorably than the overall student ratings. The results supported Mc Keachie's (1959) conclusion that students differentiate between instructors in spite of a halo effect.

The results which demonstrated less favorable ratings for nonmodal instructor types for engineering has implications for engineering education and higher education in general. If behavior change is considered to be a goal of higher education, the following point seems relevant. A nonmodal type instructor with behaviors rated less favorably by engineering students, might be more effective in changing student behaviors than a modal type (INTJ) who would reinforce existing student behaiovrs. From the study, it was noted that ENFP instructor type was rated less favorably than the INTJ

modal type. Students did not favor ENFP instructor type with their ratings, but it might be educationally desirable for engineering students to develop behaviors which are postulated for ENFP types: E-ease with environment; N-insight, ingenuity, grasp of complicated; F-capacity for devotion and sympathy; and P-adaptability. More attention and analysis of this type of question was suggested by the tentative results of the study.

The study indicated the limited variety of psychological types which are found among engineering faculty and junior-senior engineering students. Assuming that Colleges of Engineering are now attracting their share of the limited quantity of modal engineering student types, the future engineering enrollments will continue to decline in relation to total enrollments of higher education unless engineering can attract and retain a greater variety of student types. A greater variety of psychological types among engineering faculty would be one possible way to accomplish such an objective. Changing existing engineering programs and varying instructor activities to provide realistic engineering models for undergraduates have also been suggested by students as procedures to attract and to retain more students in engineering.

The high proportion of INTJ instructors indicated that the engineering students in the study probably encountered abstract and theoretical classroom instruction. Being introverted intuitives, the INTJ instructors were also theoretically the most independent

and individualistic of all the possible Myers-Briggs types. The six INTJ instructors in the study were also theoretically ideal for research. In contrast with general opinion, the study revealed that engineering instructors who were ideally suited for research, were not poor instructors according to student ratings, but rather, the most favorably rated.

A final conclusion from the study refuted the concept that faculty members would strongly oppose student ratings of their classes. Engineering instructors displayed a genuine interest in receiving data about student reactions for their classes. From the experience of the study, it was possible to report that cooperation of instructors can be achieved for the purpose of studying student instructional ratings.

Recommendations The results of this exploratory study of student instructional evaluation in terms of student-faculty psychological types provided evidence to support the application of the Myers-Briggs Type Indicator modal in academic settings. Several kinds of additional research efforts were suggested.

1. From the evidence of modal Myers-Briggs psychological types among junior and senior engineering students, additional research into the persistence or non-persistence of nonmodal student psychological types would be advisable. The persistence of nonmodal types in Electrical

and Mechanical Engineering should be appraised. The pattern of success for nonmodal types and the change of majors by nonmodal types should also be investigated. Significant results in such a study might be extremely helpful in the advising of freshman engineering students as well as other majors.

2. The apparent selective process of psychological types among engineering students suggests a predictive type of use for the Myers-Briggs Type Indicator. A longitudinal study with entering freshman engineering students should provide evidence of the probability of certain student types to remain in engineering or to change to another major.

   A study of engineering students who change to business before or after receiving their undergraduate degrees might reveal these students who change to business are sensing types and more like business students than engineering students. Sensing students were more frequent in Mechanical Engineering than Electrical Engineering. Many Mechanical Engineering students begin graduate study in business after competing an engineering degree. These factors could be combined to design a study related to Astin's (1965) conclusions that a student's career choice is affected by the modal career choice of the student population.

3. Similar studies of student-faculty types should be conducted by other departments or by a combination of academic departments. Similar data from other departments could establish relationships

between academic areas and specific psychological types of students as well as instructors. The patterns of major changes between academic areas might explain a large degree of the relationships between psychological types and the factors of curricula choice and success by students.

4. Detailed studies with the Student Instructional Rating Report are essential. To establish meaningful data which can be interpreted by individual instructors, data similar to that reported in the study must be collected by other departments. Two specific recommendations related to the SIRR resulted from the study. SIRR Category IV - Course Demands is very confusing and is difficult to interpret. If the SIRR is revised, Category IV should be changed to make it more compatible with the other categories. Otherwise it should be separated from the profile and be reported by itself. There is also a vital need for more information to explain the SIRR form and data to faculty, especially the interpretation of the Composite Profile Data. The use of student ratings by persons other than the instructors, should be carefully analyzed.

5. The need for continued research of the Myers-Briggs Type Indicator is necessary to verify the reported validity and reliability of the instrument. The potential use of the instrument in studying aspects of an educational setting is strongly suggested by the study. The results of this exploratory study suggest that the instrument might be a valuable

tool for assessing experimental programs and activities in higher education, in addition to student instructional ratings.

6. The results of the study are not appropriate to suggest drastic changes in the administrative policies of a department, but they do emphasize the potential influence of personal variables among instructors in determining student reaction to instruction in the classroom. The final recommendation is that higher education concentrate less on the matters of class size, instructional techniques, and amount of contact, but emphasize the types of student-faculty academic contacts which will take advantage of the attitudes, interests, and interpersonal skills of various instructor psychological types.

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# APPENDIX

## STUDENT INSTRUCTIONAL RATING REPORT

Please read the instructions on the reverse side before completing this form.
Using a pencil respond only in the answer area provided next to each statement.

| LECTURE | ANSWER AREA |
|---|---|
| 1. The instructor was enthusiastic when presenting course material. | 1. |
| 2. The instructor seemed to be interested in teaching. | 2. |
| 3. The instructor's use of examples or personal experiences helped to get points across in lecture. | 3. |
| 4. The instructor seemed to be concerned with whether the students learned the material. | 4. |
| 5. You were interested in learning the course material. | 5. |
| 6. You were generally attentive in class. | 6. |
| 7. You felt that this course challenged you intellectually. | 7. |
| 8. You have become more competent in this area due to this course. | 8. |
| 9. The instructor encouraged students to express opinions. | 9. |
| 10. The instructor appeared receptive to new ideas and others' viewpoints. | 10. |
| 11. The student had an opportunity to ask questions. | 11. |
| 12. The instructor generally stimulated class discussion. | 12. |
| 13. The instructor attempted to cover too much material. | 13. |
| 14. The instructor generally presented the material too rapidly. | 14. |
| 15. The homework assignments were too time consuming relative to their contribution to your understanding of the course material. | 15. |
| 16. You generally found the coverage of topics in the assigned readings too difficult. | 16. |
| 17. The instructor appeared to relate the course concepts in a systematic manner. | 17. |
| 18. The course was well organized. | 18. |
| 19. The instructor's class presentations made for easy note taking. | 19. |
| 20. The direction of the course was adequately outlined. | 20. |
| 21. You generally enjoyed going to class. | 21. |
| 22. | 22. |
| 23. Instructor may insert three (3) items in these spaces. | 23. |
| 24. | 24. |

STUDENT BACKGROUND: Select the most appropriate alternative.

| | |
|---|---|
| 25. Was this course required in your degree program? 1) yes 2) no | 25. |
| 26. Was this course recommended to you by another student? 1) yes 2) no | 26. |
| 27. What is your overall GPA? 1) 1.9 or less 2) 2.0-2.2 3) 2.3-2.7 4) 2.8-3.3 5) 3.4-4.0 | 27. |
| 28. How many other courses have you had in this department? 1) none 2) 1-2 3) 3-4 4) 5-6 5) 7 or more. | 28. |
| 29. | 29. |
| 30. Instructor may insert two (2) items in this space. | 30. |

**DO NOT ANSWER THE QUESTIONS BELOW THE LINE UNLESS THIS COURSE HAS LABORATORY OR RECITATION SECTIONS**

| LABORATORY or RECITATION: | |
|---|---|
| 31. The laboratory or recitation instructor clarified lecture material. | 31. |
| 32. The laboratory or recitation instructor adequately prepared you for the material covered in his section. | 32. |
| 33. You generally found the laboratories or recitations interesting. | 33. |
| 34. | 34. |
| 35. Instructor may insert two (2) items in this space. | 35. |

WRITE and MARK in the box at the right your recitation or laboratory section number. Section number 1 would be written 001; section number 15 would be written 015; and so forth.

RECITATION OR LABORATORY SECTION NUMBER

# STUDENT INSTRUCTIONAL RATING REPORT

## PART I

One way in which an instructor can improve his class is through thoughtful student reactions. This instructor hopes to use your responses for self-examination and self-improvement. Please omit any of the items which do not pertain to the course that you are rating. For example, if you have had no homework assignments in this course omit (leave blank) those items pertaining to homework. For each statement on the reverse side blacken space:

1 if you strongly agree with the statement
2 if you agree with the statement
3 if you neither agree nor disagree with the statement
4 if you disagree with the statement
5 if you strongly disagree with the statement

Now complete the items on the reverse side.

## PART II

If you have any comments to make concerning the instructor or the course, please write them in the shaded area below.