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Identification of Personality Traits of Various Academic Interests

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IDENTIFICATION OF PERSONALITY TRAITS OF
VARIOUS ACADEMIC INTERESTS

A Thesis
Presented to
the Graduate Faculty
Central Washington State College

In Partial Fulfillment
of the Requirements for the Degree
Master of Education

by
Jerry Maurice Gower
August 1964

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APPROVED FOR THE GRADUATE FACULTY

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CHAPTER I

THE PROBLEM, DEFINITIONS, AND OVERVIEW

The usefulness of personality measures in educational and vocational counseling may be enhanced by determining if characteristic personality patterns for students of various areas in education exist and by establishing normative data relative to specific occupations, educational majors, and personality factors. Sternberg (22:16) states that "knowledge of a trait pattern of a particular student can be helpful in clarifying the related needs of the student and can serve to provide one guide to help him choose the best field of study for himself". Due to the fact that there are definitely measurable relationships between personality and vocational interest, personality inventories might be useful instruments in a guidance program. It is possible that these inventories would help students who intend to teach to select major subject areas in which they find persons and materials with which they are compatible (22:442-443). Because of the increasing awareness of the importance of understanding relationships among test scores in the counseling of students, this study emphasizes patterns of personality test scores among particular groups.

I. THE PROBLEM

Statement of the problem. It was the purpose of this study to determine if students exhibit unique personality patterns specific to various areas of study in education. Specifically, do students majoring in Art and Industrial Art, Biological and Physiological Science, and Health and Physical Education at Central Washington State College exhibit different personality patterns as indicated by the Institute for Personality and Ability Testing (IPAT) 16 Personality Factor Questionnaire (16 P. F.)? This problem suggests the following hypothesis:

Hypothesis. There are identifiable and significant differences in personality traits between teacher education candidates at Central Washington State College majoring in the areas of Art and Industrial Art, Biological and Physiological Science, and Health and Physical Education on the IPAT 16 Personality Factor Questionnaire, Form A, which will be reflected as a difference between each group and college students as a whole.

II. DEFINITIONS OF TERMS USED

Personality. The definition of personality used in this study is "that which permits a prediction of what a person will do in a given situation (10:2).

Personality trait. A personality trait is a factor of personality which is constantly developing and changing and will refer to one or all sixteen personality factors derived by the IPAT and determined with the use of the "16 P. F."

Identifiable. Identifiable will mean "to make known or to describe" (27:392).

The sixteen personality factors. The sixteen personality factors used in this study are those included and described in the IPAT Handbook for the Sixteen Personality Factor Questionnaire, by R. B. Cattell (9:11-19). They are described in considerable detail in Chapter IV of this study where the results are discussed.

III. OVERVIEW OF FOLLOWING CHAPTERS

Chapter I has presented the problem and the hypothesis. Due to the various differences in the meaning of certain terms, the more important and complex of these used in this study were defined. Chapter II is devoted to a review of the related literature. Each of the three groups, Art and Industrial Art, Biological and Physiological Science and Health and Physical Education are discussed in terms of research investigations similar to the one presented in this thesis. Chapter III is entitled, Experimental Procedure. This chapter contains the procedure, population, and sample

used and the manner in which the data was analyzed. Chapter IV contains all results. The comparisons between each of the groups as well as the results on each of the sixteen factors are presented. Chapter V includes the summary and conclusions drawn from the results of this study. Suggestions for further studies are presented.

CHAPTER II

REVIEW OF THE LITERATURE

A number of studies have attempted to define personality characteristics of persons with various occupational and academic interests (11, 23, 24, 26). Only a brief summary on topics of similar scope to the one presented in this thesis will be reported.

I. LITERATURE ON PERSONALITY CHARACTERISTICS OF ART AND INDUSTRIAL ART GROUPS

Roe, (11:8) after giving a battery of projective tests, reported that she could find no personality pattern common to a group of twenty leading American painters. Similarly, Borg (7:154) found a group of college art students not at all homogenous in traits on personality tests. For most of the traits measured, a greater percentage of the art students score in the undesirable extremes than do college students in general. "The differences are greatest in traits usually included in the adult's stereotype of the artist such as cycloid disposition, agreeableness, cooperativeness, and thinking introversion (7:154)".

Andersen and Munroe (1:150) found a very small number of trends differentiating painting design, and general liberal

arts college groups from each other. The painting group lived out their problems more through their work and were more idiosyncratic than the design group.

Munsterburg and Mussen (19:465) reported that art students harbor more guilt feeling; cannot comply with parent's or society's demands; tend to be introverted, with a rich fantasy life; are not materialistic; and seek acceptance of their work over recognition of the self.

Holland (15) studied personality variables as measured by the Minnesota Multiphasic Personality Inventory (MMPI) and their behavioral correlates as seen in oil paintings. He found significant relationships between high and low scores on the MMPI and criteria describing and evaluating their paintings. Of interest from the measurement viewpoint was his discovery that measurable scoring categories for paintings are not necessarily more reliable than subjective categories. Borg (8:383) also published findings on factors relating to art school success in the form of correlations with tests of mechanical comprehension, adjustment, mental alertness, and interest. The highest correlation was with mechanical comprehension.

Barron (4:296) found that graduate students scoring high on the Welsh Art Scale had definite modern preferences among reproductions of paintings, were rebellious at traditional, judgments, more unstable, unbalanced, and irrational.

He also found "independents" scoring higher than "yielders" on the same scale.

Beittel reported that those scoring above the mean for their group on his esthetic attitude measure accumulated significant items on a personality inventory named by Murray "endocathection" and "intraception" (exhibiting an imaginative, subjective, human outlook). He states that "it has also been suggested that anti-intraception characterizes the authoritarian type of mind" (6:60).

Thurstone (29) reported certain descriptive differences, objectively determined, of those who were form or color bound on his color form test. The former seemed more emotionally stable and dominant and the latter more argumentative, impulsive, expansive, and self-centered.

Barron studied relationships between originality and style of personality, after classifying his subjects by a battery of eight tests of uncommonness of response. Originality was found "to be related to independence of judgment, to personal complicity to self-assertion and dominance, and to the rejection of suppression as a mechanism for the control of impulse" (5:202).

Spiaggia compared results of fifty male art students with the same number of adult males on the MMPI and found that "the art student is more typically introverted, exhibits a greater tendency toward depression, possesses a ten-

dency to disregard social mores, or an inability to adjust to the outer world, and more feminine in his basic interest pattern" (21:290).

Borg (7:154) used the Bell Adjustment Inventory with eighty art college students and found no significant differences between his groups scores and the test norm.

Similarly, Barrett (3:491) found a group of college women art students not at all homogenous in traits on the personality test but the differences, however, were small and inconclusive.

II. LITERATURE ON PERSONALITY CHARACTERISTICS OF BIOLOGICAL AND PHYSIOLOGICAL SCIENCE GROUPS

In a study of western Australian students, Anderson found that male students majoring in the humanities scored significantly higher than male science students on extrovert qualities, tenseness, and Bohemianism. He states that the men are "lower on stability, persistence and independence (i. e., in item of second order factor, science students are relatively introverted and stable, and art students relatively extroverted and anxious)" (2:6).

Hancock (14:225-226) administered the MMPI to a group of ninety-three students enrolled in the College of Engineering, two hundred three in the College of Liberal Arts and Sciences, and fifty-four in the College of Commerce and Busi-

ness Administration. He found that the Liberal Arts and Science students are more similar to clinic patients who are characterized by delusions of persecution, oversensitivity, and suspiciousness than Engineering students.

Teevan's (25:213) study with the use of the Blackie Pictures found that the science division had the lowest disturbance scores on nearly all the categories than did the literature and social sciences divisions.

Carl Sternberg's study of the personality trait patterns of college students majoring in different fields seems to be the most comprehensive. The purpose of his study was to determine the patterns of measurable personality traits and the differences in the patterns among the students majoring in various areas. He states that "the emphasis in the study was on patterns of test scores because of the increasing awareness of the importance of understanding relationships among test scores in the counseling of students. Knowledge of a trait pattern of a particular student can be helpful in clarifying the related needs of the student and can serve to provide one guide to help him choose the best field of study for himself" (22:442-443).

"Two hundred seventy male students, thirty from each of the nine fields were given the Kuder Preference Record, the Allport-Vernon study of Values, and the MMPI. Sternberg's results showed that "each sub-group differs from every other

sub-group in mean scores on at least one factor by a margin which is significant at or beyond the one per cent level of confidence". The sharpest differences are those which separate the "aesthetic" group (English and Music) from the "science" group (Chemistry, Mathematics, Biochemistry, and possibly Psychology). "Differences can be seen most clearly when students majoring in different areas of study such as humanities and fine arts are compared" (14:442-443).

III. LITERATURE ON PERSONALITY CHARACTERISTICS OF HEALTH AND PHYSICAL EDUCATION GROUPS

Sperling, in his study with two athletic groups and one non-athletic group found interests or motivational values of the varsity and intramural groups were more motivated by desire for power and less motivated by a social love of people. The athletic group was reported to be less aesthetic and theoretically minded. "In personality adjustment scores, ascendance, and extroversion, the varsity and intramural groups proved to be reliably superior to the non-athletic group" (20:362).

The successful women in physical education who participated in a study by Thorpe scored significantly higher than the normative group in the following personality traits as measured by the Edwards Personal Preference Schedule: deference, order, dominance, and endurance. She concludes her

study by saying, "there tends to be an extending pattern of similarity of personality variables among the 255 successful women teachers, graduate students and senior majors in physical education who participated in this study" (28:90).

IV. SUMMARY OF LITERATURE REVIEW

In summary, it might be said that there is increased interest in the study of the correlates of esthetic and creative tendencies. No generalizable personality types applicable to various academic interests or vocational choices has been found; although, small differences are reported between artists and non-artists in specific comparisons.

There are indications that differences within specific groups tend to be greater than differences between groups. It seems that when differences are found between groups, that these differences are between unrelated fields of specialization, e. g. mathematics vs. literature.

CHAPTER III

EXPERIMENTAL PROCEDURE

The following procedures were used in this study:

1. A list of all juniors and seniors enrolled at Central Washington State College, at the beginning of winter quarter, 1963, was obtained from the registrar's office.
2. The total number of junior and senior participants from the major areas investigated, in groups of approximately ten to twenty students were given the IPAT 16 P. F. Questionnaire, Form A, in Black Hall, during the spring quarter of 1963.
3. The IPAT 16 P. F. Questionnaire, Form A was used for the following reasons:
 - (1) "There is an abundance of analytic research that has been devoted to it's construction.
 - (2) A series of researches at different age levels through childhood growth has established that the chief personality factors in the IPAT 16 P. F. exist also throughout the main growth period" (9:1).
4. Students were not grouped for purposes of testing according to their areas of academic specialization.
5. The fifty minute test was administered in one setting and hand scored by the method prescribed by Cattell in the IPAT instruction manual for the 16 P. F. Questionnaire, Form A (9:5-6). The test was monitored by the author and at

least one other person.

6. The mean 16 P. F. Questionnaire scores on each of the 16 factors of the three groups were compared with each other and with the mean 16 P. F. Questionnaire scores on each of the 16 factors for the Normative Group, indicated in the manual, to determine the significance of difference of the personality characteristics between the four groups.

I. POPULATION AND SAMPLES USED

Population used. The population for this study was comprised of Central Washington State College juniors and seniors majoring in the fields of Art and Industrial Art, Biological and Physiological Science, and Health and Physical Education. The subjects for this study have completed a two year prescribed general education program and are now studying in their chosen areas of specialization (See Table I). Sarason states, "we hold it a basic fact that an individual, at least a normal individual, cannot maintain an interest in an activity unless he is reasonably good at it" (19:83).

Samples used. All subjects were volunteers. They were not notified of the purpose of the study until it was completed. They were told that the study was to obtain information for a Master's thesis and that all information would be coded to avoid identification of specific persons.

TABLE I
POPULATION TABLE

| Area | Number(n) of Subjects | Total (n) Tested | Total % Tested |
|-----------------------|--------------------------|--------------------------------------|----------------|
| Art | 34 | 24 | 74 |
| Industrial Art | 36 | 28 | |
| Biological Science | 30 | 21 | 70 |
| Physiological Science | 21 | 15 | |
| Health & Physical Ed. | <u>66</u> | <u>47</u> | 71 |
| | Total Pop. <u>187</u> | Total Sample Tested <u>135</u> | |

Department chairmen were informed of the nature of this investigation and encouraged student participation. (See Appendixes 1-4.)

Seventy percent of the Biological and Physiological Science group participated. Seventy-one percent of the Health and Physical Education group were participants. Seventy-four percent of the Art and Industrial Art group participated. (See Table I.)

II. ANALYSIS OF DATA

In dealing with research where relationships between variables are important, a major concern is the determination of whether or not these observed relationships are of sufficient magnitude to be considered significant.

The present study was designed to examine the relationship of three separate groups. Because the sample was relatively small and restricted to departments in a specific college, the relationships found cannot be taken as definitive but only as suggestive for further research. The five percent level of confidence was taken in order for a difference to be considered significant. ($P < .05$).

An analysis of differences between the independent means (t-test) was made to determine the significance of differences between the four groups. The formulae used in the calculation of the t-difference is presented below (30:131).

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sum x_1^2}{k_1(k_1-1)} + \frac{\sum x_2^2}{k_2(k_2-1)}}$$

CHAPTER IV

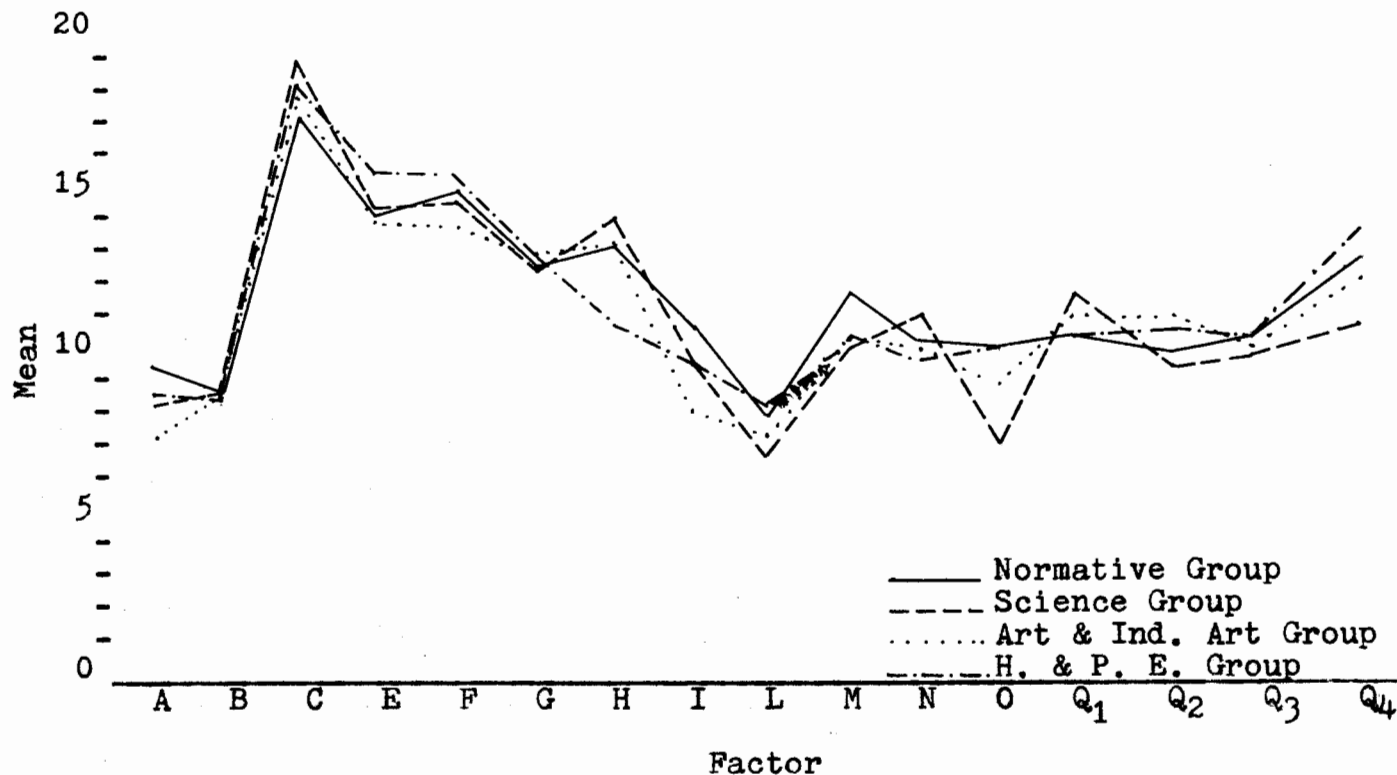
RESULTS

The results are presented in this chapter for each of the factors on the "16 P. F." whether or not significant differences were found. Significant differences indicate differences at or above the five percent confidence level. (See Tables IV-IX.) The results are presented for each of the six group comparisons: Art and Industrial Art vs. College Normative (Table IV), Science vs. the College Normative (Table V), Health and Physical Education vs. the College Normative (Table VI), Art and Industrial Art vs. the Health and Physical Education (Table VII), Art and Industrial Art vs. the Science (Table VIII), and Science vs. the Health and Physical Education (Table IX). Profiles for each of the four groups are presented in Figure 1. Table II shows each of the factors which are or are not significant in each of the six comparisons. Table III indicates results obtained from comparing each group with every other group.

The findings presented in this chapter will relate to the hypothesis presented in Chapter I which is as follows: There are identifiable and significant differences in personality traits between teacher education candidates at Central Washington State College majoring in the areas of Art and In-

FIGURE 1

GROUP MEAN PROFILES ON THE 16 FACTORS OF THE FOUR SAMPLE GROUPS



dustrial Art, Biological and Physiological Science, and Health and Physical Education on the IPAT Sixteen Personality Factor Questionnaire, Form A, which will be reflected as a difference between each group and college students as a whole.

I. RESULTS OF THE SIXTEEN PERSONALITY FACTORS

Factors significant. In the comparison of the four groups, the following factors were significant at or above the five percent level of confidence: A, C, E, H, I, L, M, N, O, Q₁, Q₂, and Q₄. (See Tables IV-IX.) A description of each, as stated in the manual is as follows:

FACTOR A

| | | |
|-------------------------------------|--------|------------------------------------|
| CYCLOTHYMIA, A+ (WARM, SOCIABLE) | Versus | SCHIZOTHYMIA, A- (ALOOF, STIFF) |
|-------------------------------------|--------|------------------------------------|

This factor has been found to load most highly the following traits:

| | | |
|-----------------------------|-----|-----------------------------------|
| Good Natured, Easy Going | vs. | Aggressive, Grasping, Critical |
| Ready to Co-operate | vs. | Obstructive |
| Attentive to People | vs. | Cool, Aloof |
| Soft-Hearted, Kindly | vs. | Hard, Precise |
| Trustful | vs. | Suspicious |
| Adaptable | vs. | Rigid |
| Warm-Hearted | vs. | Cold |

FACTOR C

| | | |
|--|--------|--|
| EMOTIONAL STABILITY OR EGO STRENGTH, C+ (CALM, MATURE) | Versus | DISSATISFIED EMOTION- ALITY, C- (EMOTIONAL, IMMATURE, UNSTABLE) |
|--|--------|--|

This factor loads:

| | | |
|--------------------|-----|-------------------------------------|
| Emotionally Mature | vs. | Lacking in Frustration Tolerance |
|--------------------|-----|-------------------------------------|

| | | |
|--------------------------------|-----|--|
| Emotionally Stable | vs. | Changeable (in attitudes) |
| Calm, Phlegmatic | vs. | Showing General Emotionality |
| Realistic about Life | vs. | Evasive (on awkward issues and in facing personal decisions) |
| Absence of Neurotic Fatigue | vs. | Neurotically Fatigued |
| Placid | vs. | Worrying |

FACTOR E

| | | |
|--|--------|--|
| DOMINANCE OR ASCENDANCE, E+ (AGGRESSIVE, COMPETITIVE) | Versus | SUBMISSION, E- ("MILK-TOAST", MILD) |
| Assertive, Self-Assured | vs. | Submissive |
| Independent Minded | vs. | Dependent |
| Hard, Stern | vs. | Kindly, Soft-Hearted |
| Solemn | vs. | Expressive |
| Unconventional | vs. | Conventional |
| Tough | vs. | Easily Upset |
| Attention Getting | vs. | Self-Sufficient |

FACTOR H

| | | |
|--|--------|---|
| PARMIA, H+ (ADVENTUROUS, "THICK-SKINNED") | Versus | THRECTIA, H- (SHY, TIMID) |
| Adventurous, Likes Meeting People | vs. | Shy, Withdrawn |
| Active, Overt Interest in Opposite Sex | vs. | Retiring in Face of Opposite Sex |
| Responsive, Genial | vs. | Aloof, Cold, Self- Contained |
| Friendly | vs. | Apt to be Embittered |
| Impulsive and Frivolous | vs. | Restrained, Conscientious |
| Emotional and Artistic Interests | vs. | Restricted Interests |
| Carefree, Does not See Danger Signals | vs. | Careful, Considerate, Quick to See Dangers |

FACTOR I

| | | |
|--|--------|----------------------------------|
| PREMSIA, I+ (SENSITIVE, EFFEMINATE) | Versus | HARRIA, I- (TOUGH, REALISTIC) |
|--|--------|----------------------------------|

| | | |
|--|-----|---|
| Demanding, Impatient, Subjective | vs. | Realistic, Expects Little |
| Dependent, Seeking Help | vs. | Self-reliant, Taking Responsibility |
| Kindly, Gentle | vs. | Hard (to point of cynicism) |
| Artistically Fastidious, Affected | vs. | Few Artistic Responses (but not lacking taste) |
| Imaginative in Inner Life and in Conversation | vs. | Unaffected by "Fancies" |
| Acts on Sensitive In- tuition | vs. | Acts on Practical Logical Evidence |
| Attention Seeking, Fri- volous | vs. | Self-sufficient |
| Hypochondriacal, Anxious | vs. | Unaware of Physical Disabilities |

FACTOR L

| | | |
|--|--------|--|
| PROTENSION (PARANOID TENDENCY), L+ (SUSPECTING, JEALOUS) | Versus | RELAXED SECURITY, L- (ACCEPTING, ADAPTABLE) |
| Jealous | vs. | Accepting |
| Self-sufficient | vs. | Outgoing |
| Suspicious | vs. | Trustful |
| Withdrawn, Brooding | vs. | Open, Ready to Take a Chance |
| Tyrannical | vs. | Understanding and Per- missive, Tolerant |
| Hard | vs. | Soft-Hearted |
| Irritable | vs. | Composed and Cheerful |

FACTOR M

| | | |
|---|--------|---|
| AUTIA, M+ (BOHEMIAN INTROVERTED, ABSENT-MINDED) | Versus | PRAXERNIA, M- (PRACTICAL, CONCERNED WITH FACTS) |
| Unconventional, Self Absorbed | vs. | Conventional, Alert to Practical Needs |
| Interested in Art, Theory, Basic Beliefs | vs. | Interests Narrowed to Immediate Issues |
| Imaginative, Creative | vs. | No Spontaneous Creativity |
| Frivolous, Immature in Practical Judgment | vs. | Sound, Realistic, Depend- able, Practical Judgment |
| Generally Cheerful, but Occasional Hysterical Swings of "Giving-up" | vs. | Earnest, Concerned or Worried, but Very Steady |

FACTOR N

| | | |
|---|--------|--|
| SHREWDNESS, N+ (SOPHISTICATED, POLISHED) | Versus | NAIVETE, N- (SIMPLE, UNPRETENTIOUS) |
| Polished, Socially Alert | vs. | Socially Clumsy and Natural |
| Exact, Calculating Mind | vs. | Vague and Sentimental Mind |
| Aloof, Emotionally Dis- ciplined | vs. | Warm, Gregarious, Spontaneous |
| Esthetically Fastidious | vs. | Simple Tastes |
| Insightful Regarding Self | vs. | Lacking Self Insight |
| Ambitious, Possibly In- secure | vs. | Content with What Comes |
| Expedient, "Cuts Corners" | vs. | Trusts in Accepted Values |

FACTOR O

| | | |
|--|--------|--|
| GUILT PRONENESS, O+ (TIMID, INSECURE) | Versus | CONFIDENT ADEQUACY, O- (CONFIDENT, SELF-SECURE) |
| Worrying, Anxious | vs. | Self-Confident |
| Depressed | vs. | Cheerful, Resilient |
| Sensitive, Tender, Easily Upset | vs. | Tough, Placid |
| Strong Sense of Duty | vs. | Expedient |
| Exacting, Fussy | vs. | Does Not Care |
| Hypochondriacal | vs. | Rudely Vigorous |
| Phobic Symptoms | vs. | No Fears |
| Moody, Lonely, Brooding | vs. | Given to Simple Action |

FACTOR Q₁

| | | |
|------------------------------|--------|--|
| RADICALISM, Q ₁ + | Versus | CONSERVATISM OF TEMPERAMENT, Q ₁ - |
|------------------------------|--------|--|

FACTOR Q₂

| | | |
|---|--------|---|
| SELF-SUFFICIENCY, Q ₂ + (SELF-SUFFICIENT, RESOURCEFUL) | Versus | GROUP DEPENDENCY, Q ₂ - (SOCIABLY GROUP DEPENDENT) |
|---|--------|---|

FACTOR Q₄

| | | |
|--|--------|---|
| HIGH ERGIC TENSION, Q ₄ + (TENSE, EXCITABLE) | Versus | LOW ERGIC TENSION, Q ₄ - (PHLEGMATIC, COMPOSED) |
|--|--------|---|

Factors not significant. The remaining four factors, B, F, G, and Q₃ in the comparison of the four groups were not

significant at or above the five percent level of confidence. (See Tables IV-IX.) Each of the factors is described in the manual as follows:

FACTOR B

GENERAL
INTELLIGENCE, B+
(BRIGHT)

Versus

MENTAL
DEFECT, B-
(DULL)

The measurement of intelligence has been shown to carry with it as a factor in the personality realm some of the following ratings:

| | | |
|------------------------|-----|-----------------|
| Conscientious | vs. | Of Lower Morale |
| Persevering | vs. | Quitting |
| Intellectual, Cultured | vs. | Boorish |

FACTOR F

SURGENCY, F+
(ENTHUSIASTIC
HAPPY-GO-LUCKY)

Versus

DESURGENCY, F-
(GLUM, SOBER,
SERIOUS)

| | | |
|------------------------|-----|-----------------------|
| Talkative | vs. | Silent, Introspective |
| Cheerful | vs. | Depressed |
| Serene, Happy-go-Lucky | vs. | Concerned, Brooding |
| Frank, Expressive | vs. | Incommunicative, Smug |
| Quick, Alert | vs. | Languid, Slow |

FACTOR G

CHARACTER OR SUPER-
EGO STRENGTH, G+
(CONSCIENTIOUS,
PERSISTENT)

Versus

LACK OF RIGID INTER-
NAL STANDARDS, G-
(CASUAL, UNDEPENDABLE)

| | | |
|-------------------------|-----|----------------------|
| Persevering, Determined | vs. | Quitting, Fickle |
| Responsible | vs. | Frivolous |
| Emotionally Mature | vs. | Demanding, Impatient |
| Consistently Ordered | vs. | Relaxed, Indolent |
| Conscientious | vs. | Undependable |
| Attentive to People | vs. | Obstructive |

FACTOR Q₃

HIGH SELF-SENTIMENT
FORMATION, Q₃⁺
(CONTROLLED, EXACTING
WILL POWER)

POOR SELF-SENTIMENT
FORMATION, Q₃⁻
(UNCONTROLLED, LAX)

Factors significant or not significant in each of the comparisons. Table II indicates the factors which were or were not significant in each of the six comparisons.

Factor A was found to be significant for the Art and Industrial Art vs. the Normative group, Science vs. the Normative group and Health and Physical Education vs. the Normative group. The three groups Art and Industrial Art vs. Health and Physical Education, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education were not found to be significant on Factor A.

On Factor B differences were not found significant between any of the six group comparisons.

Factor C was found to be significant for the groups Science vs. the Normative, Health and Physical Education vs. the Normative, and Art and Industrial Art vs. Health and Physical Education. The three groups Art and Industrial Art vs. Normative, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education were found not be significant on Factor C.

Factor E was found to be significant for the Health and Physical Education vs. the Normative group. All other group comparisons, Art and Industrial Art vs. Normative, Sci-

TABLE II
 FACTORS SIGNIFICANT OR NOT SIGNIFICANT
 IN EACH OF THE SIX GROUP COMPARISONS*

| | SIGNIFICANT | | | | | | NOT SIGNIFICANT | | | | | |
|----------------|-------------|---|---|---|---|---|-----------------|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 1 | 2 | 3 | 4 | 5 | 6 |
| A | X | X | X | | | | | | | X | X | X |
| B | | | | | | | X | X | X | X | X | X |
| C | | X | X | X | | | X | | | | X | X |
| E | | | X | | | | X | X | | X | X | X |
| F | | | | | | | X | X | X | X | X | X |
| G | | | | | | | X | X | X | X | X | X |
| H | | | X | X | | X | X | X | | | X | |
| I | X | X | | X | | | | | X | | X | X |
| L | | X | | | | X | X | | X | X | X | |
| M | X | X | X | | | | | | | X | X | X |
| N | | X | | | | X | X | | X | X | X | |
| O | | X | | | X | X | X | | X | X | | |
| Q ₁ | | X | | | | | X | | X | X | X | X |
| Q ₂ | X | | | | | | | X | X | X | X | X |
| Q ₃ | | | | | | | X | X | X | X | X | X |
| Q ₄ | X | | | X | | X | | X | X | | X | |

- *1 Art and Industrial Art vs. Normative
- 2 Science vs. Normative
- 3 Health and Physical Education vs. Normative
- 4 Art and Industrial Art vs. Health and Physical Education
- 5 Art and Industrial Art vs. Science
- 6 Science vs. Health and Physical Education

ence vs. Normative, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education were not significant when compared on Factor E.

Factors F and G were found not to be significant for any of the six comparisons.

Factor H was found to be significant for the groups Health and Physical Education vs. Normative, Art and Industrial Art vs. Health and Physical Education, and Science vs. Health and Physical Education. The remaining three groups, Art and Industrial Art vs. Normative, Science vs. Normative, and Art and Industrial Art vs. Science, were found not to be significant.

Factor I was found to be significant for the groups Art and Industrial Art vs. Normative, Science vs. Normative, Art and Industrial Art vs. Health and Physical Education. The three groups, Health and Physical Education vs. Normative, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education were found not to be significant on Factor I.

Factor L was found to be significant for two groups. These groups were: Science vs. Normative, and Science vs. Health and Physical Education. The remaining four groups, Art and Industrial Art vs. Normative, Health and Physical Education vs. Normative, Art and Industrial Art vs. Health and Physical Education, and Art and Industrial Art vs. Science

were found not to be significant.

Factor M was found to be significant for the three groups Art and Industrial Art vs. Normative, Science vs. Normative, and Health and Physical Education vs. Normative. The remaining three groups, Art and Industrial Art vs. Health and Physical Education, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education were found not to be significant on Factor M.

Factor N was found to be significant for the groups Science vs. Normative, Science vs. Health and Physical Education. All other group comparisons, Art and Industrial Art vs. Normative, Health and Physical Education vs. Normative, Art and Industrial Art vs. Health and Physical Education, and Art and Industrial Art vs. Science, were found not to be significant on Factor N.

Factor O was found to be significant for the Science vs. Normative Group, Art and Industrial Art vs. the Science group, and the Science vs. the Health and Physical Education group. The three groups, Art and Industrial Art vs. Normative, Health and Physical Education vs. Normative, and Art and Industrial Art vs. Health and Physical Education, were found not to be significant.

Factor Q_1 was found to be significant for the Science vs. the Normative Group. All other groups, Art and Industrial Art vs. Normative, Health and Physical Education vs. Normative,

Art and Industrial Art vs. Health and Physical Education, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education, were found not to be significant on Factor Q₁.

Factor Q₂ was found to be significant for the Art and Industrial Art group vs. the Normative Group. All other groups, Science vs. Normative, Health and Physical Education vs. Normative, Art and Industrial Art vs. Health and Physical Education, Art and Industrial Art vs. Science, and Science vs. Health and Physical Education, were found not to be significant.

Factor Q₃ was found not to be significant for any of the six comparisons.

Factor Q₄ was found to be significant for the groups Art and Industrial Art vs. Normative, Art and Industrial Art vs. Health and Physical Education, and Science vs. Health and Physical Education. The remaining three groups, Science vs. Normative, Health and Physical Education vs. Normative, and Art and Industrial Art vs. Science were found not to be significant.

II. RESULTS OF THE COMPARISONS BETWEEN EACH GROUP

Personality Characteristics of the Art and Industrial Art Group vs. the College Normative Group. The sample used in this analysis was comprised of fifty-two college Art and

Industrial Art students and the College Normative Group described in the "16 P. F." manual. A composite picture of the significant differences between the Normative Group personality characteristics and the personality characteristics of the Art and Industrial Art group as suggested by the "16 P. F." is presented in Table III and Table IV.

Scores were significantly different ($P < .01$) toward the negative side of the scale between the Art and Industrial Art group and the Normative Group on Factor A. The manual describes that the A+ individual "expresses marked preference for occupations dealing with people, enjoys social recognition, and is generally willing to "go along" with expediency; while the A- person likes things or words (particularly material things), working alone, intellectual companionship, and avoidance of compromise" (9:11).

Factor I showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and the Art and Industrial Art students as a group. The manual states that "occupationally, it should distinguish interior decorators, musicians, and artists from engineers and surgeons and perhaps sensitive clinicians from psychometrists" (9:15).

Factor M showed a significant difference toward the negative side of the scale at the five percent level of confidence between the Normative Group and the Art and Industrial

TABLE III

FACTORS SIGNIFICANT BETWEEN EACH GROUP*

| | Art and Ind. Art | Health and P. E. | Science | Normative |
|------------------|---------------------------------|-------------------------------------|--|--|
| Art and Ind. Art | | C-, H+, I-, Q ₄ - | O+ | A-, I-, M-, Q ₂ + |
| Health and P. E. | C+, H-, I+, Q ₄ + | | H+, L-, N+, O-, Q ₄ - | A-, C+, E+, H-, M- |
| Science | O- | H-, L+, N-, O+, Q ₄ + | | A-, C+, I-, L-, M-, N+, O-, Q ₁ +, Q ₄ - |
| Normative | A+, I+, M+, Q ₂ - | A+, C-, E-, H+, M+ | A+, C-, I+, L+, M+, N-, O+, Q ₁ -, Q ₄ + | |

*Comparisons are directional. Always contrast groups listed on the left with the group listed above.

TABLE IV

t-TEST COMPARISON OF 52 ART AND INDUSTRIAL ART STUDENTS
WITH THE COLLEGE NORMATIVE GROUP ON THE 16 FACTORS OF
THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | I. A. | C. | Mean Difference | SD | | t Difference | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-----|-----------------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | I. A. | C. | | | |
| A | 7.096 | 9.3 | 2.204 | 3.170 | 3.4 | 4.6370 | 654 | .01* |
| B | 8.135 | 8.5 | .365 | 2.393 | 1.9 | .4845 | 654 | |
| C | 17.596 | 16.9 | -.696 | 3.391 | 3.3 | 1.4227 | 654 | |
| E | 14.827 | 13.9 | -.927 | 3.388 | 3.8 | 1.8731 | 654 | |
| F | 14.423 | 14.6 | .177 | 3.249 | 3.5 | .3749 | 654 | |
| G | 12.769 | 12.1 | -.669 | 2.676 | 3.1 | 1.7071 | 654 | |
| H | 13.134 | 12.9 | -.234 | 3.699 | 5.0 | .4239 | 654 | |
| I | 7.942 | 10.3 | 2.358 | 3.393 | 3.5 | 4.7975 | 654 | .01* |
| L | 7.154 | 7.6 | .446 | 3.005 | 3.4 | 1.0155 | 654 | |
| M | 10.288 | 11.5 | 1.212 | 3.722 | 3.5 | 2.2633 | 654 | .05** |
| N | 9.962 | 9.7 | -.262 | 3.646 | 2.7 | .5064 | 654 | |
| O | 8.808 | 9.6 | .792 | 3.156 | 3.5 | 1.7206 | 654 | |
| Q ₁ | 10.808 | 9.7 | 1.108 | 3.604 | 3.1 | 1.4900 | 654 | |
| Q ₂ | 11.077 | 9.4 | -1.677 | 3.079 | 3.4 | 3.7349 | 654 | .01* |
| Q ₃ | 9.673 | 9.5 | -.173 | 2.439 | 2.6 | .4881 | 654 | |
| Q ₄ | 11.212 | 12.1 | .888 | 4.234 | 4.6 | 1.4406 | 654 | |

*2.586 t-difference required for $P < .01$

**1.965 t-difference required for $P < .05$

Art students as a group. The manual states that the groups with low M scores occur "in occupations requiring mechanical sense, realism and alertness" (9:16). High M occurs "in artists, researchers, planning executives and editors" (9:16).

Factor Q_2 shows a significant difference toward the positive side of the scale at the one percent level of confidence.

The remaining 12 Factors of this test, B, C, E, F, G, H, L, N, O, Q_1 , Q_3 , and Q_4 , did not reach the five percent level of confidence in the t-difference between the Art and Industrial Art group and the Normative Group.

Personality Characteristics of the Science Group vs. the College Normative Group. The sample used in this analysis was comprised of thirty-six Science students and the College Normative Group. A composite picture of the significant differences between the Normative Group personality characteristics and the personality characteristics of the Science group as suggested by the "16 P. F." is presented in Table III and Table V.

Factor A showed a significant difference toward the negative side of the scale ($P < .05$) between the Normative Group and Science students as a group. The manual describes that the A+ individual "expresses marked preference for occupations dealing with people, enjoys social recognition, and is generally willing to "go along" with expediency; while the

TABLE V

t-TEST COMPARISON OF 36 SCIENCE STUDENTS
WITH THE COLLEGE NORMATIVE GROUP ON THE 16 FACTORS OF
THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | S. | C. | Mean Difference | SD | | t Difference | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-----|-----------------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | S. | C. | | | |
| A | 8.083 | 9.3 | 1.217 | 3.211 | 3.4 | 2.2019 | 638 | .05** |
| B | 8.444 | 8.5 | .056 | 1.843 | 1.9 | .0673 | 638 | |
| C | 18.888 | 16.9 | - 1.988 | 3.353 | 3.3 | 3.4586 | 638 | .01* |
| E | 14.083 | 13.9 | - .108 | 3.597 | 3.8 | 1.7496 | 638 | |
| F | 14.111 | 14.6 | .489 | 3.852 | 3.5 | .7435 | 638 | |
| G | 12.167 | 12.1 | - .067 | 3.535 | 3.1 | .1112 | 638 | |
| H | 13.889 | 12.9 | - .989 | 4.921 | 5.0 | 1.1704 | 638 | |
| I | 9.167 | 10.3 | 1.133 | 3.032 | 3.5 | 2.1581 | 638 | .05** |
| L | 6.305 | 7.6 | 1.295 | 2.659 | 3.4 | 2.7885 | 638 | .01* |
| M | 9.833 | 11.5 | 1.667 | 2.709 | 3.5 | 3.5198 | 638 | .01* |
| N | 11.028 | 9.7 | - 1.328 | 2.431 | 2.7 | 3.1619 | 638 | .01* |
| O | 6.889 | 9.6 | 2.711 | 2.446 | 3.5 | 6.2769 | 638 | .01* |
| Q ₁ | 11.528 | 9.7 | - 1.828 | 2.989 | 3.1 | 4.9959 | 638 | .01* |
| Q ₂ | 9.806 | 9.4 | - .406 | 3.022 | 3.4 | .7769 | 638 | |
| Q ₃ | 9.917 | 9.5 | - .417 | 2.102 | 2.6 | 1.1393 | 638 | |
| Q ₄ | 10.334 | 12.1 | 1.766 | 3.985 | 4.6 | 2.5587 | 638 | .01* |

*2.586 t-difference required for $P < .01$

**1.965 t-difference required for $P < .05$

A- person likes things or words (particularly material things) working alone, intellectual companionship, and avoidance of compromise" (9:11).

Factor C showed a significant difference ($P < .01$) toward the positive side of the scale between the Normative Group and Science students as a group. The manual states that the C- person is "easily annoyed by things and people, is dissatisfied with the world situation, his family, the restrictions of life, and his own health" (9:12).

Factor I showed a significant difference ($P < .05$) toward the negative side of the scale between the Normative Group and Science students as a group. The manual states that an I+ person "shows a fastidious dislike for "crude" people and rough occupations, a liking for travel and new experiences" (5:15).

Factor L showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and Science students as a group. The manual states that "there are some very positive performances associated with protension in creative fields, e.g., of religion and science. The opposite pole is one of easy going, friendly relaxation and perhaps lack of ambition and striving" (9:16).

Factor M showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and the Science students as a group. The manual states

that the groups with low M scores occur "in occupations requiring mechanical sense, realism, and alertness" (9:16). High M occurs "in artists, researchers, planning executives and editors" (9:16).

Factor N showed a significant difference ($P < .01$) toward the positive side of the scale between the Normative Group and Science students as a group. The manual states that the groups scoring highest are the "skilled professions and precision occupations, . . . and the ones who score lowest are priests, nurses, psychiatric technicians, cooks and convicts" (9:17)! Hadley finds high N negatively correlated with teaching success (9:17).

Factor O showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and the Science students as a group. The manual states that "groups with high scores occur in senior clerks, writers, waitresses, and editorial workers, and low in professional athletics, electricians, firemen, nurses, priests and salesmen" (9:17).

Factor Q_1 showed a significant difference ($P < .01$) toward the positive side of the scale between the Normative Group and the Science students as a group. The manual describes Factor Q_1 as "persons who are more well informed, more inclined to experiment with problem solutions and less inclined to moralize" (9:18).

Factor Q_4 showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and the Science students as a group. The manual describes Factor Q_4 as involving "being irrationally worried, tense, irritable, anxious, and in turmoil" (9:19)!

The remaining seven factors of this test, B, E, F, G, H, Q_2 , and Q_3 , did not reach the five percent level of confidence in the difference between the Science group and the Normative Group.

Personality Characteristics of the Health and Physical Education Group vs. the College Normative Group. The sample used in this analysis was comprised of forty-seven Health and Physical Education students and the College Normative Group. A composite picture of the significant differences between the Normative Group personality characteristics and the personality characteristics of the Health and Physical Education group as suggested by the "16 P. F." is presented in Table III and Table VI.

Factor A showed a significant difference ($P < .05$) toward the negative side of the scale between the Normative Group and Health and Physical Education students as a group. The manual describes the A+ individual as one who "expresses marked preference for occupations dealing with people, enjoys social recognition and is generally willing to "go along" with expediency; while the A- person likes, things or words

TABLE VI

t-TEST COMPARISON OF 47 HEALTH AND PHYSICAL EDUCATION STUDENTS
WITH THE COLLEGE NORMATIVE GROUP ON THE 16 FACTORS OF
THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | H-PE | C. | Mean Difference | SD | | t | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-----|--------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | H-PE | C. | | | |
| A | 8.149 | 9.3 | - 1.151 | 3.028 | 3.4 | 2.4859 | 649 | .05** |
| B | 7.702 | 8.5 | - .798 | 2.115 | 1.9 | .8387 | 649 | |
| C | 18.043 | 16.9 | 1.143 | 2.466 | 3.3 | 3.8417 | 649 | .01* |
| E | 15.340 | 13.9 | 1.440 | 3.726 | 3.8 | 2.5482 | 649 | .05** |
| F | 15.255 | 14.6 | .655 | 2.916 | 3.5 | 1.4597 | 649 | |
| G | 12.170 | 12.1 | .070 | 2.987 | 3.1 | .1543 | 649 | |
| H | 10.745 | 12.9 | - 2.155 | 4.835 | 5.0 | 2.9070 | 649 | .01* |
| I | 9.596 | 10.3 | - .704 | 2.755 | 3.5 | 1.6506 | 649 | |
| L | 8.064 | 7.6 | .464 | 3.655 | 3.4 | .8423 | 649 | |
| M | 10.234 | 11.5 | - 1.266 | 3.336 | 3.5 | 2.4961 | 649 | .05** |
| N | 9.362 | 9.7 | - .338 | 2.548 | 2.7 | .8718 | 649 | |
| O | 9.830 | 9.6 | .230 | 3.080 | 3.5 | .4878 | 649 | |
| Q ₁ | 10.511 | 9.7 | .811 | 3.413 | 3.1 | 1.5799 | 649 | |
| Q ₂ | 9.872 | 9.4 | .472 | 2.650 | 3.4 | 1.1492 | 649 | |
| Q ₃ | 9.681 | 9.5 | .181 | 2.622 | 2.6 | .4564 | 649 | |
| Q ₄ | 14.064 | 12.1 | 1.964 | 4.135 | 4.6 | .3686 | 649 | |

*2.586 t-difference required for $P < .01$

**1.965 t-difference required for $P < .05$

(particularly material things), working alone, intellectual companionship, and avoidance of compromise" (9:11).

Factor C showed a significant difference ($P < .01$) toward the positive side of the scale between the Normative Group and Health and Physical Education students as a group. The manual describes the C- person as "easily annoyed by things and people, is dissatisfied with the world situation, his family, the restrictions of life and his own health" (9:12).

Factor E showed a significant difference ($P < .05$) toward the positive side of the scale between the Normative Group and Health and Physical Education students as a group. The manual states that groups "averaging high on this Factor show more effective role interaction and democratic procedure" (9:12).

Factor H showed a significant difference ($P < .01$) toward the negative side of the scale between the Normative Group and Health and Physical Education students as a group. The manual states that "the H+ person feels free to participate, receives more than the average share of votes as ineffective speakers, and make more socio-emotional than task-oriented remarks" (9:14).

Factor M showed a significant difference ($P < .05$) toward the negative side of the scale between the Normative Group and Health and Physical Education students as a group.

The manual states that the groups with high M scores occur in "artists, researchers, planning executives and editors" (9:16).

The remaining eleven Factors of this test, B, F, G, I, L, N, O, Q₁, Q₂, Q₃, and Q₄, did not reach the five percent level of confidence in the t difference between the Health and Physical Education group and the Normative Group.

Personality Characteristics of the Art and Industrial Art Group vs. the Health and Physical Education Group. The sample used in this analysis was comprised of forty-seven Health and Physical Education students and fifty-two Art and Industrial Art students. A composite picture of the Health and Physical Education students as suggested by the "16 P. F." is presented in Table III and Table VII.

Factor C showed a significant difference ($P < .01$) toward the negative side of the scale between the Art and Industrial Art students as a group and the Health and Physical Education students as a group. The manual describes the C+ individuals such as "teachers, engineers, salesmen, and firemen as running well above average on the C Factor" (9:12).

Factor H showed a significant difference ($P < .05$) toward the positive side of the scale between the Art and Industrial Art students as a group and the Health and Physical Education students as a group. The manual states that the H+ Factor is very "important in distinguishing suitability for

TABLE VII

t-TEST COMPARISON OF 52 ART AND INDUSTRIAL ART STUDENTS
WITH 47 HEALTH AND PHYSICAL EDUCATION STUDENTS ON THE 16 FACTORS OF
THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | I. A. | H-PE | Mean Difference | SD | | t Difference | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-------|-----------------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | I. A. | H-PE | | | |
| A | 7.096 | 8.149 | - 1.053 | 3.170 | 3.028 | 1.6894 | 97 | |
| B | 8.135 | 7.702 | .433 | 2.393 | 2.115 | .9631 | 97 | |
| C | 17.596 | 18.043 | - .447 | 3.391 | 2.466 | 2.7712 | 97 | .01* |
| E | 14.827 | 15.340 | - .513 | 3.388 | 3.726 | .7142 | 97 | |
| F | 14.423 | 15.255 | - .832 | 3.249 | 2.916 | 1.3424 | 97 | |
| G | 12.769 | 12.170 | .599 | 2.676 | 2.987 | 1.0467 | 97 | |
| H | 13.134 | 10.745 | 2.389 | 3.699 | 4.835 | 2.2700 | 97 | .05** |
| I | 7.942 | 9.596 | - 1.654 | 3.393 | 2.755 | 2.6729 | 97 | .01* |
| L | 7.154 | 8.064 | - .910 | 3.005 | 3.655 | 1.3446 | 97 | |
| M | 10.288 | 10.234 | .058 | 3.722 | 3.336 | .0761 | 97 | |
| N | 9.962 | 9.362 | .600 | 3.646 | 2.548 | .9562 | 97 | |
| O | 8.808 | 9.830 | - 1.022 | 3.156 | 3.080 | .9041 | 97 | |
| Q ₁ | 10.808 | 10.511 | .297 | 3.604 | 3.413 | .3354 | 97 | |
| Q ₂ | 11.077 | 9.872 | 1.205 | 3.079 | 2.650 | 2.0916 | 97 | |
| Q ₃ | 9.673 | 9.681 | - .008 | 2.439 | 2.622 | .0157 | 97 | |
| Q ₄ | 11.212 | 14.064 | - 2.852 | 4.234 | 4.135 | 3.7014 | 97 | .01* |

*2.626 t-difference required for $P < .01$

**1.984 t-difference required for $P < .05$

those occupations demanding ability to face wear and tear in dealing with people and gruelling emotional situations" (9:14).

Factor I showed a significant difference ($P < .01$) toward the negative side of the scale between the Art and Industrial Art students as a group and the Health and Physical Education students as a group. The manual states that "occupationally, it should distinguish interior decorators, musicians, and artists from engineers and surgeons and perhaps sensitive clinicians from psychometrists" (9:15)!

Factor Q_4 showed a significant difference ($P < .01$) toward the negative side of the scale between the Art and Industrial Art students as a group and the Health and Physical Education students as a group. The manual describes Factor Q_4 as involving "being irrationally worried, tense, irritable, anxious, and in turmoil" (9:19)!

The remaining twelve Factors of this test, A, B, E, F, G, L, M, N, O, Q_1 , Q_2 , and Q_3 , did not reach the five percent level of confidence in the t-difference between the Art and Industrial Art students and the Health and Physical Education student group.

Personality Characteristics of the Art and Industrial Art Group vs. the Science Group. The sample used in this analysis was comprised of fifty-two Art and Industrial Art students and thirty-six Science students. A composite picture

of the significant differences between the Art and Industrial Art group personality characteristics and the personality characteristics of the Science group as suggested by the "16 P. F." is presented in Table III and Table VIII.

The only factor that showed a significant difference ($P < .01$) toward the positive side of the scale between the comparison of the Art and Industrial Art students with Science students was Factor O. The manual states that groups with high scores "occur in senior clerks, writers, waitresses, and editorial workers, low in professional athletics, electricians, firemen, nurses, priests and salesmen" (9:17-18).

The remaining fifteen Factors, A, B, C, E, F, G, H, I, L, M, N, Q₁, Q₂, Q₃, and Q₄, did not reach the five percent level of confidence in the difference between the Art and Industrial Art group and the Science group.

Personality Characteristics of the Science Group vs. the Health and Physical Education Group. The sample used in this analysis was comprised of thirty-six Science students and forty-seven Health and Physical Education students. A composite picture of the significant differences between the Science group personality characteristics and the personality characteristics of the Health and Physical Education students as suggested by the "16 P. F." is presented on Table III and Table IX.

Factor H showed a significant difference ($P < .01$) to-

TABLE VIII

t-TEST COMPARISON OF 52 ART AND INDUSTRIAL ART STUDENTS
WITH 36 SCIENCE STUDENTS ON THE 16 FACTORS OF
THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | I. A. | S. | Mean Difference | SD | | t Difference | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-------|-----------------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | I. A. | S. | | | |
| A | 7.096 | 8.083 | - .987 | 3.170 | 3.211 | 1.4267 | 86 | |
| B | 8.135 | 8.444 | - .309 | 2.393 | 1.843 | .6833 | 86 | |
| C | 17.596 | 18.888 | - 1.292 | 3.391 | 3.353 | 1.7689 | 86 | |
| E | 14.827 | 14.083 | .744 | 3.388 | 3.597 | .0977 | 86 | |
| F | 14.423 | 14.111 | .312 | 3.249 | 3.852 | .6965 | 86 | |
| G | 12.769 | 12.167 | .602 | 2.676 | 3.535 | .8658 | 86 | |
| H | 13.134 | 13.889 | - .755 | 3.699 | 4.921 | .7804 | 86 | |
| I | 7.942 | 9.167 | - 1.225 | 3.393 | 3.032 | 1.7743 | 86 | |
| L | 7.154 | 6.305 | .849 | 3.005 | 2.659 | 1.3955 | 86 | |
| M | 10.288 | 9.833 | .455 | 3.722 | 2.709 | .6678 | 86 | |
| N | 9.962 | 11.028 | - .066 | 3.646 | 2.431 | 1.6622 | 86 | |
| O | 8.808 | 6.889 | 1.919 | 3.156 | 2.446 | 3.2070 | 86 | .01* |
| Q ₁ | 10.808 | 11.528 | - .720 | 3.604 | 2.989 | .8899 | 86 | |
| Q ₂ | 11.077 | 9.806 | 1.271 | 3.079 | 3.022 | 1.9196 | 86 | |
| Q ₃ | 9.673 | 9.917 | - .234 | 2.439 | 2.102 | .4805 | 86 | |
| Q ₄ | 11.212 | 10.334 | .878 | 4.234 | 3.985 | .9902 | 86 | |

*2.632 t-difference required for $P < .01$

**1.987 t-difference required for $P < .05$

TABLE IX

t-TEST COMPARISON OF 36 SCIENCE STUDENTS
WITH 47 HEALTH AND PHYSICAL EDUCATION STUDENTS ON THE 16 FACTORS
OF THE 16 P. F. QUESTIONNAIRE

| 16 P. F. | H-PE | S. | Mean Difference | SD | | t | Degrees of Freedom | Level of Significance |
|----------------|---------------|---------------|--------------------|-------|-------|--------|-----------------------|--------------------------|
| | Group Mean | Group Mean | | H-PE | S. | | | |
| A | 8.149 | 8.083 | - .066 | 3.028 | 3.211 | .0951 | 81 | |
| B | 7.702 | 8.444 | .742 | 2.115 | 1.843 | 1.7188 | 81 | |
| C | 18.043 | 18.888 | .845 | 2.466 | 3.353 | 1.2713 | 81 | |
| E | 15.340 | 14.083 | - 1.257 | 3.726 | 3.597 | 1.5540 | 81 | |
| F | 15.255 | 14.111 | - 1.145 | 2.916 | 3.852 | 1.4820 | 81 | |
| G | 12.170 | 12.167 | - .003 | 2.987 | 3.535 | .0041 | 81 | |
| H | 10.745 | 13.889 | 3.144 | 4.835 | 4.921 | 2.8847 | 81 | .01* |
| I | 9.596 | 9.167 | - .429 | 2.755 | 3.032 | .6644 | 81 | |
| L | 8.064 | 6.305 | - 1.759 | 3.655 | 2.659 | 2.5364 | 81 | .05** |
| M | 10.234 | 9.833 | - .401 | 3.336 | 2.709 | .6038 | 81 | |
| N | 9.362 | 11.028 | 1.666 | 2.548 | 2.431 | 3.0291 | 81 | .01* |
| O | 9.830 | 6.889 | - 2.941 | 3.080 | 2.446 | 4.8459 | 81 | .01* |
| Q ₁ | 10.511 | 11.528 | 1.017 | 3.413 | 2.989 | 1.6815 | 81 | |
| Q ₂ | 9.872 | 9.806 | - .066 | 2.650 | 3.022 | .1039 | 81 | |
| Q ₃ | 9.681 | 9.917 | .236 | 2.622 | 2.102 | .4550 | 81 | |
| Q ₄ | 14.064 | 10.334 | - 3.730 | 4.135 | 3.985 | 4.4902 | 81 | .01* |

*2.638 t-difference required for $P < .01$

**1.990 t-difference required for $P < .05$

ward the negative side of the scale between the Science group and the Health and Physical Education students as a group. The manual states that the H Factor is very "important in distinguishing suitability for those occupations demanding ability to face wear and tear in dealing with people and gruelling emotional situations" (9:14).

Factor L showed a significant difference ($P < .05$) toward the positive side of the scale between the Science group and Health and Physical Education students as a group. The manual states that "there are some very positive performances associated with the protension in creative fields, e. g., of religion and science. The opposite pole is one of easy going, friendly relaxation and perhaps lack of ambition and striving" (9:16).

Factor N showed a significant difference ($P < .01$) toward the negative side of the scale between the Science group and the Health and Physical Education students as a group. The manual states that the groups scoring highest are the "skilled professions and precision occupations . . . and the lowest are priests, nurses, psychiatric technicians, cooks, and convicts" (9:17)!

Factor O showed a significant difference ($P < .01$) toward the positive side of the scale between the Science group and the Health and Physical Education students as a group. The manual states that groups with low scores occur in "pro-

professional athletes, electricians, firemen, nurses, and priests and salesmen" (9:17-18). Groups scoring high on Factor 0 occurs in senior clerks, writers, waitresses, and editorial workers" (9:17).

Factor Q_4 showed a significant difference ($P < .01$) toward the positive side of the scale between the Science group and the Health and Physical Education students as a group. The manual describes Factor Q_4 as "involving being irrationally worried, tense, irritable, anxious and in turmoil" (9:19).

The remaining eleven Factors, A, B, C, E, F, G, I, M, Q_1 , Q_2 , Q_3 of this test did not reach the five percent level of confidence in the t-difference between the Science group and the Health and Physical Education group.

Raw frequency distributions will be retained in the author's personal file for a period of five years so varification of present results or cross validation of the "16 P. F." may be undertaken by those interested in such research.

CHAPTER V

SUMMARY AND CONCLUSIONS

I. SUMMARY

The present study has attempted to determine whether there are identifiable patterns and significant differences between three Central Washington State College groups and between college students as a whole. The groups were comprised of fifty-two Art and Industrial Art students, forty-seven Health and Physical Education students, and thirty-six Biological and Physiological Science students. Six hundred-four general college students comprised the Normative Group.

Each experimental group consisted of juniors and seniors majoring in education in the above areas of specialization. To determine whether the four groups were significantly different, a t-test was used to determine differences between the independent means. Comparisons were determined on each of the sixteen factors and for each of the independent groups.

The results indicate that there are identifiable and significant personality factors between the Art and Industrial Art, Health and Physical Education, and the Science students when tested in groups on the "16 P. F.". These can be identified most easily from Table III in Chapter IV.

The Art and Industrial Art group scored significantly different ($P < .05$) than did the Normative Group on Factors A, I, M, and Q_2 . These significant factors may indicate that the Art and Industrial Art students, as a group, are (A-) "more aloof, stiff", (I-) "tough, realistic", (M-) "practical, concerned with facts", and (Q_2+) "self-sufficient" than the Normative Group.

The Art and Industrial Art group scored significantly different ($P < .05$) when compared with the Health and Physical Education group on Factors C, H, I, and Q_4 . These significant factors may indicate that the Art and Industrial Art students, as a group, are more (C-) "emotional, immature, unstable", (H+) "adventurous, thick-skinned", (I-) "tough, realistic", (Q_4+) "phlegmatic, composed" than the Health and Physical Education students as a group.

The Art and Industrial Art group scored significantly different ($P < .05$) when compared with the Science students on Factor O. This single significant factor may indicate that the personality of the Art and Industrial Art student is compatible with the Science student and that the Art and Industrial Art student is (O+) more "timid and insecure" than the Science student when compared as groups. It is of interest that differences in intelligence are not found since the stereotype in our culture indicates that the Art and Industrial Art student works "with his hands" whereas the Science

student works "with his brain".

The Science students scored significantly different ($P < .05$) than the Normative Group on Factors A, C, I, L, M, N, O, Q_1 , and Q_4 . It appears that the Science students as a group are (A-) "more aloof, stiff", (C+) "mature, calm", (I-) "tough, realistic", (L-) "accepting, adaptable", (M-) "practical, concerned with facts", (N+) "sophisticated, polished", (O-) "confident, self-secure", (Q_1 +) "radical", (Q_4 -) "phlegmatic" and composed than the Normative Group.

The Health and Physical Education students scored significantly different ($P < .05$) than the Normative group on Factors A, C, E, H, and M. These significant factors may indicate that the Health and Physical Education students, as a group, are more (A-) "aloof, stiff", (C+) "mature, calm", (E+) "aggressive, competitive", (H-) "shy, timid", and (M-) "practical, concerned with facts" than are the Normative Group.

The Science students scored significantly different ($P < .05$) when compared with the Health and Physical Education students on Factors H, L, N, O, and Q_4 . It appears that the Science students as a group are more (H-) "shy, timid", (L+) "suspecting, jealous", (N-) "simple, unpretentious", (O+) "timid, insecure", (Q_4 +) "tense and excitable" than the Health and Physical Education students as a group.

Factor Q_1 is unique in that it was only found to be

significant in the comparison between the Science and the Normative Group. This may possibly indicate that Factor Q_1 (Radicalism vs. Conservatism) may differentiate the Science student and general college population more clearly from any of the other groups tested and that the Science student is more radical than the college students who comprised the Normative Group.

Factor E is unique in that it was only found to be significant in the comparison between the Health and Physical Education group and the Normative Group. This may possibly indicate that Factor E (Dominance vs. Submission) may differentiate the Health and Physical Education students and the general college population from any of the other groups tested and that Health and Physical Education students are more aggressive and competitive than the college students who comprised the Normative Group.

Factor Q_2 is unique in that it was only found to be significant in the comparison between the Art and Industrial Art and the Normative Group. This may possibly indicate that Factor Q_2 (Self-sufficiency vs. Group Dependency) differentiates the Art and Industrial Art group and the general college population from any of the other groups and that the Art and Industrial Art student is more self-sufficient than the college students who comprised the Normative Group.

II. CONCLUSIONS

Each group differs from every other group in mean scores on at least one factor by a margin which is significant at or above the five percent level of confidence. Therefore, the author finds no reason to reject the Hypothesis which indicates that identifiable patterns could be found.

A visual comparison of the four groups, as indicated in Figure 1, appears to indicate no observable differences. When these separate groups are compared statistically, differences between groups are readily found on specific factors.

Due to the fact that twenty-eight of the ninety-six personality factors, (sixteen on each of the comparisons), are significantly different, the author finds no reason to reject the Hypothesis which indicates that significant differences would be found.

The results indicate that the four groups are similar in various personality factors. They are similar (no significant difference was found between any comparison) in; general intelligence, enthusiasm, conscientiousness, and self-sentiment.

The results indicate numerous significant differences between groups. This may possibly support, in part, Sternberg's results. He states that "each sub-group differs from every other sub-group in mean scores on at least one factor

and that differences can be seen most clearly when students majoring in different areas of study, such as humanities and fine arts are compared" (14:442-443).

It is the author's opinion that personality profiles, similar to the ones found in this study, are useful instruments in a guidance program. As Sternberg states, "they may be helpful in clarifying the related needs of the student and can serve to provide one guide to help him choose the best field of study for himself" (22:16).

III. RECOMMENDATIONS FOR FURTHER STUDY

It may be interesting to examine whether the subjects tested were successful in their chosen areas of specialization. This may indicate that persons with a particular personality pattern, as was found herein, have a better chance for success than individuals with atypical personality patterns.

No mention in this study was made to personality patterns particular to various fields as per sex (male vs. female). It may be interesting to examine whether there are or are not specific personality patterns between the sexes in each of the major fields.

As stated previously, relationships (between groups) found cannot be taken as definitive, but only suggestive for further research. It is possible that the groups tested are

atypical since Central Washington State College has been noted as a "teacher's college". Therefore, it seems desirable to repeat the present study with samples of other populations of students enrolled in various major areas so that more confidence may be placed upon the results.

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APPENDIX

TO: Division Chairmen
Department Chairmen

FROM: J. Wesley Crum

DATE: April 4, 1963

Jerry Gower, a psychology major is working on a Master of Education degree with a School Psychologist specialization, wishes to conduct a research study entitled "Identification of Personality Traits of Students with Various Academic Interests." He desires to give a personality test to junior and senior students in selected major field in the teacher education program.

He plans to contact certain department chairmen in the near future to discuss ways of gaining cooperation of faculty and students in this study. It would be appreciated if you would listen to him and see what can be done to make his study possible.

He has hopes of finding faculty members in selected courses who will permit him to give the test during a class period in order to get the full cooperation of the students majoring in that field. Perhaps you may think of other ways of getting full participation by the student group he has selected. What ever you can do to help him in this study will be very much appreciated, I am sure.

jm
jmg

I am currently working toward a Master's degree in Education and would like to enlist your aid in the completion of my thesis entitled, "The Identification of Personality Traits of Students with Various Academic Interests."

To complete my study I would like you to take a short questionnaire (approx. 30 min.) in room 208 from 9 to 12 or from 1 to 4 on Thursday, May 23, in Black Hall. Any 30 minutes of your time will do. There are no right or wrong answers and all scores will be kept STRICTLY confidential.

If you, the examinee, would like to know your personal personality profile -- arrangements can be made to report this to you.

I am testing all juniors and seniors majoring in education in the areas of Health and Physical Education, Art and Industrial Arts, and the Sciences. Without your cooperation I will not be able to complete my thesis; therefore ...need I say more.

Thank you,

Jerry M. Gower

I feel that Mr. Gower's study will benefit the Science program. As chairman of this department, I urge you to devote 30 minutes of your time in helping him with his study.

Thank you,

Bruce A. Robinson
Division Chairman

Please note:

The signatures have been redacted due to security reasons

I am currently working towards a Master's degree in education and would like to enlist your aid in the completion of my thesis entitled "The Identification of Personality Traits of Students with Various Academic Interests."

To complete my study I would like you to take a short questionnaire (approx. 30 min.) in room 208 from 9 to 12 or room 110 from 1 to 4 on Thursday, May the 23rd in Black Hall. Any 30 minutes of your time will do. There are no right or wrong answers and all scores will be kept STRICTLY confidential.

If you, the examinee, would like to know your personality profile - - arrangements can be made to report this to you.

I am testing all juniors and seniors majoring in education in the areas of Health and Physical Education, Art and Industrial Arts, and the Sciences. Without your cooperation I will not be able to complete my thesis, therefore need I say more.

Thank You

Jerry M. Gower

I feel that Mr. Gowers's study will benefit the Art and Industrial Arts program. As chairman of this department, I urge you to devote 30 minutes of your time in helping him with his study.

Thank You

Louis A. Kollmeyer
Division Chairman

Please note:

The signatures have been redacted due to security reasons

I am currently working towards a Master's degree in education and would like to enlist your aid in the completion of my thesis entitled "The Identification of Personality Traits of Student with Various Academic Interests."

To complete my study I would like you to take a short questionnaire (approx. 30 min.) in room 208 from 9 to 12 or room 110 from 1 to 4 on Thursday, May the 23rd in Black Hall. Any 30 minutes of your time will do. There are no right or wrong answers and all scores will be kept STRICTLY confidential.

If you, the examinee, would like to know your personal personality profile - arrangements can be made to report this to you.

I am testing all juniors and seniors majoring in education in the areas of Health and Physical Education, Art and Industrial Arts, and the Sciences. Without your cooperation I will not be able to complete my thesis, therefore need I say more.

Thank You

Jerry M. Gower

I feel that Mr. Gower's study will benefit the Health and Physical Education program. As chairman of this department, I urge you to devote 30 minutes of your time in helping him with his study.

Thank You

A. H. Poffenroth
Division Chairman

Please note:

The signatures have been redacted due to security reasons