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A DESCRIPTION OF COLLEGE FRESHMEN--I. STUDENTS WITH DIFFERENT CHOICES OF MAJOR FIELD.

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COLLEGE FRESHMEN PLANNING TO MAJOR IN DIFFERENT FIELDS OF STUDY ARE DESCRIBED. THE SAMPLE STUDIED INCLUDED 12,432 COLLEGE FRESHMEN ENROLLED IN 31 INSTITUTIONS OF HIGHER EDUCATION DURING APRIL AND MAY 1964. THE AMERICAN COLLEGE SURVEY WAS USED TO ASSESS STUDENT CHARACTERISTICS. INCLUDED IN THIS SURVEY IS THE VOCATIONAL PREFERENCE INVENTORY, POTENTIAL ACHIEVEMENT SCALES, EXTRACURRICULAR ACHIEVEMENT RECORD, PRECONSCIOUS ACTIVITY SCALE, RANGE OF COMPETENCIES, INTERPERSONAL COMPETENCY SCALE, RANGE OF EXPERIENCE SCALE, INTELLECTUAL RESOURCES IN THE HOME SCALE, DOGMATISM SCALE, STUDENT ORIENTATION SURVEY, AND A FORM TO ASSESS OTHER INFORMATION SUCH AS PERSONAL DATA, EDUCATIONAL AND ECONOMIC ASPIRATIONS, LIFE GOALS, AND SELF RATINGS, MEANS AND STANDARD DEVIATIONS WERE COMPUTED FOR 117 STUDENT CHARACTERISTICS FOR EACH MAJOR FIELD WITH TEN OR MORE STUDENTS. USING SIMPLE ANALYSES OF VARIANCE, SIGNIFICANT RESULTS WERE OBTAINED FOR 52 STUDENT VARIABLES. MAJOR FIELDS WERE THEN GROUPED INTO 13 ACADEMIC AREAS AND TABLES PREPARED TO SHOW THE CHARACTERISTICS MOST DESCRIPTIVE OF THE MAJOR FIELDS COMPRISING THAT AREA. SINCE ANALYSIS OF THE TABLES SHOWS THAT STUDENTS WHO PLAN TO ENTER A FIELD DO ENTER THAT FIELD, THE RESULTS APPEAR TO HAVE SOME PRACTICAL VALUE. THIS IS ACT RESEARCH REPORT NO. 3, MAY, 1965. (SK)

# ACT

# RESEARCH REPORTS

## A DESCRIPTION OF COLLEGE FRESHMEN

## I. STUDENTS WITH DIFFERENT CHOICES OF MAJOR FIELD

May, 1965 No. 3

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# A Description of College Freshmen: I. Students with Different Choices of Major Field

Clifford Abe and John L. Holland

The selection of a major field is a decision faced by every college student. Although the process of making wise choices is incompletely understood, most people have assumed that satisfying choices require some matching of student characteristics and competencies with the demands of the prospective field of study. When a student's characteristics resemble those of the typical student in his prospective field, he is likely to feel at home and remain in his field. Conversely, incongruencies between a student and his field result in feelings of alienation and dissatisfaction and usually lead to a change of plans. These assumptions are plausible and receive some support from earlier studies (Darley and Hagenah, 1955); but because of their importance, they need a more complete empirical foundation.

The purpose of the present study is to report a description of college freshmen who plan to major in different fields of study. The descriptions of prospective majors are assumed to have several desirable properties: The descriptive variables are generally the product of simple, direct assessments of student characteristics so that they are easily interpreted by students, counselors, and faculty. The descriptions for single fields and for groups of fields are usually based on a large national sample of

college students so that the results are generally reliable as well as free of the special characteristics of prospective majors at individual colleges.

## The Student Survey

The present study grew out of the American College Survey (Abe, Holland, Lutz, and Richards, 1965), a project conducted by the American College Testing Program to obtain a more complete account of the typical American college student and of the variation among students from college to college. To accomplish these tasks, a comprehensive assessment was administered to 12,432 college freshmen in 31 institutions of higher education in the months of April or May in 1964.

The following sections characterize the student sample, and the materials and scales contained in the student survey.

### Student Sample

Several statistics characterize the student sample: seven per cent were enrolled in junior colleges, twelve per cent in four year undergraduate colleges, and eighty-one per cent in universities. About 15 per cent of these freshmen were students in private colleges, while 85 per cent were students in public colleges. About 95 per cent attended coeducational colleges. Finally, 20 per cent were enrolled in colleges in the Northeast, 31 per cent in colleges in the South, 20 per cent in colleges in the Midwest, 26 per cent in colleges in the Mountains and Plains states, but only 3 per cent in colleges on the West Coast.

The number of freshmen and the percentage of the freshman class

participating in the American College Survey varied greatly from college to college. At one extreme, 96 per cent of the Burlington Community College freshmen participated, while at the other Colorado State College submitted a selected sample of 22 per cent of their freshmen. Table 1 summarizes the rate of participation for each college.

Table 1

The Participating Colleges and the Percentage of Freshmen Who Responded to the American College Survey

| College | State | Men | Women | % of Total Fresh. Class |
|---|---|---|---|---|
| Arkansas Polytechnic College | Arkansas | 155 | 94 | 34 |
| Baylor University | Texas | 207 | 273 | 44 |
| Black Hills Teachers College | South Dakota | 102 | 74 | 46 |
| Bloom Township Community College | Illinois | 102 | 46 | 70 |
| Burlington Community College | Iowa | 135 | 72 | 96 |
| California State College at Hayward | California | 144 | 186 | 60 |
| Carthage College | Wisconsin | 33 | 89 | 44 |
| Colorado State College | Colorado | 62 | 172 | 22 |
| Fairmont State College | West Virginia | 187 | 152 | 76 |
| Glassboro State College | New Jersey | 178 | 529 | 80 |
| Indiana State College | Indiana | 233 | 333 | 28 |
| Jamestown Community College | New York | 77 | 83 | 64 |
| Kansas State University | Kansas | 641 | 511 | 73 |
| Lyons Township Junior College | Illinois | 50 | 53 | 57 |
| Mount Mercy College | Pennsylvania | -- | 150 | 91 |
| New Mexico State University | New Mexico | 198 | 81 | 29 |
| Plymouth State College | New Hampshire | 59 | 115 | 72 |
| Snow College | Utah | 82 | 63 | 49 |
| Southeastern State College | Oklahoma | 143 | 107 | 62 |
| Southern Connecticut State College | Connecticut | 147 | 398 | 77 |

Table 1 (cont.)

| College | State | Men | Women | % of Total Fresh. Class |
|---|---|---|---|---|
| Southern Illinois University | Illinois | 762 | 363 | 33 |
| Springfield College | Massachusetts | 145 | 85 | 54 |
| Swarthmore College | Pennsylvania | 69 | 50 | 44 |
| University of Alabama | Alabama | 429 | 387 | 43 |
| University of Kentucky | Kentucky | 711 | 616 | 63 |
| University of North Dakota | North Dakota | 226 | 272 | 49 |
| University of Tennessee | Tennessee | 597 | 474 | 47 |
| Wesleyan University | Connecticut | 287 | -- | 94 |
| Westbrook Junior College | Maine | -- | 169 | 81 |
| William Carey College | Mississippi | 30 | 47 | 47 |
| William Jewell College | Misscuri | 93 | 99 | 81 |
| Total Students | | 6289 | 6143 | |

The Student Survey

The assessment device used to estimate various student characteristics was called the American College Survey (1964). The American College Survey is a booklet which contains a letter explaining the purpose of the survey, and 1004 items which were concerned with a student's interests, potential for various kinds of achievement, attitudes, and other orientations. The following sections summarize our knowledge of the scales and assessment devices contained in the American College Survey.

Vocational Preference Inventory (Fifth Revision) This personality and interest inventory is composed only of occupational titles (Holland, 1958). To take the inventory, a student indicates which occupations he likes and dislikes. Scores on only the following scales were used for this

study: Realistic, Intellectual, Social, Conventional, Enterprising, Artistic, Self-Control, Aggressive, Masculine, Status, and Acquiescence. Reliabilities (Kuder-Richardson 20) ranged from .57 to .89 for 6289 male college freshmen and from .50 to .89 for 6143 females.

For the present descriptive study, it is useful to interpret the VPI only as an inventory of vocational interests. The VPI scales used and their "interest" interpretations are as follows:

| Scale | Preference for: |
|---|---|
| Realistic | technical and skilled trades |
| Intellectual | scientific occupations |
| Social | teaching and helping occupations |
| Conventional | clerical occupations |
| Enterprising | supervisory and sales occupations |
| Artistic | artistic, musical, and literary occupations |
| Self-Control | aversion to occupations involving risk of physical injury, adventure, and danger |
| Aggressive | occupations of great power and status such as UN Diplomat, College President, Prosecuting Attorney |
| Masculine | occupations typical of men |

| | |
|---|---|
| Status | prestigeful occupations such as Lawyer, Doctor, Business Executive |
| Acquiescence | number of preferred occupations |

Potential Achievement Scales. In an earlier study of National Merit Finalists (Holland and Nichols, 1964), Potential Achievement Scales were constructed empirically by sex for the prediction of six kinds of extracurricular achievement: art, music, writing, science, dramatics, and leadership. The students falling in the upper and lower 27 per cent on checklists of accomplishments for these fields in high school were compared for their preferences for 273 daily activities, hobbies, reading habits, school subjects, and sports. The upper and lower 27 per cent were drawn from samples of 500 boys and 500 girls. Typical items included working on guns, building scientific equipment, playing chess, going to a public library, giving talks, collecting rocks, playing charades, and drawing cartoons. In the first study of these scales only the 15 most discriminating items were used. Item-criterion correlations ranged from .24 to .80.

In the present study, all scales were lengthened by adding 3 to 14 items per scale. These additions were intended to increase the reliability and perhaps the validity of the Potential for Achievement Scales. The lengthened scale reliabilities (Kuder-Richardson) ranged from .72 to .84 for men and from .65 to .81 for women.

Extracurricular Achievement Record. The checklists of extracurricular accomplishment for the high school years were used earlier by Holland and Nichols (1964) and include the following areas: art, music, literature, dramatic arts, leadership, and science. The score on each scale is simply the number of accomplishments checked. Students with high scores on one or more of these simple scales have attained a high level of accomplishment which is assumed to require one or more of the following characteristics: complex skills, long term persistence, and originality. The reliabilities (K-R 21) for individual records of accomplishment range from .48 to .75 for men and from .58 to .86 for women for National Merit Finalists. In a diverse group of college freshmen, the reliabilities (K-R 20) ranged from .72 to .84 for men and from .65 to .81 for women.

Preconscious Activity Scale. This scale is an a priori scale developed to measure Kubie's (1958) notion of preconscious activity as a process in creative performance (Nichols and Holland, 1963). The Preconscious Activity Scale is a 38 item true-false scale with reliabilities (K-R 20) of .72 and .68 for male and female college freshmen. The predictive validities of this scale and its concurrent relationships with originality and interest measures imply that the Preconscious Activity Scale should be interpreted as an originality measure, especially in the fields of art, literature, and music (Nichols and Holland, 1963).

Range of Competencies. Using a list of 143 activities, students

checked the activities which they claimed that they could do well or competently. The assumption underlying these scales is that a large number of competencies is conducive to achievement generally and that competencies in a particular field are conducive to achievement in the same field. Typical items from this list included: I have a working knowledge of Roberts' Rules of Order, I can dance, I am a good cook, I can make jewelry, I can read blueprints, I can read Greek, I can operate a tractor, I can use logarithm tables, etc. The number of activities checked equals a student's range of competencies or total number of competencies. Competencies were categorized by three judges into several areas of competence: scientific, technical, governmental, athletic, business, social and educational, homemaking, arts, leadership and sales, and foreign language. Students were then scored for each kind of competency. The reliability (K-R 20) for the total number of competencies claimed was .94 and .93 for male and female college freshmen; the reliability for the special competency scales ranged from .35 to .87 and from .11 to .85 for men and women. The very low reliabilities for a few scales appear to result from the small number of items in such scales.

Interpersonal Competency Scale. This twenty item, a priori scale was modeled after the work of Foote and Cottrell (1955), who defined interpersonal competence as "acquired ability for effective interaction," and who outlined a program of research to study this concept. Scale

items simply poll the subject for those factors which Foote and Cottrell believe to be conducive to, or typical of interpersonal competency--good health, social experience and competencies, positive self-regard. The reliability (K-R 20) of the Interpersonal Competency Scale for groups of 6289 male and 6143 female college freshmen was .69 and .67 respectively.

Range of Experience. The assumption underlying the development of this scale is that breadth of experience is conducive to achievement. Students checked their experiences from a list of 76 items. Typical examples included: museum, factory, gambling casino, summer camp, mental hospital, sports car race. This scale is scored by simply counting the number of experiences checked. The reliability (K-R 20) was .92 and .90 for male and female college freshmen.

Intellectual Resources in the Home. Students checked those things they have in their homes from a list of 39 items. The assumption underlying the construction of this scale is that many as opposed to few environmental resources are conducive to achievement. Typical items included: an encyclopedia set, tape recorder, sculpturing tools, sewing machine, power tools, library of more than 200 books. The number of items checked became a student's score for this variable. The reliability (K-R 20) of this scale was .81 for male college freshmen and .78 for female college freshmen.

Dogmatism Scale. This scale, developed by Rokeach to measure dogmatic and rigid thinking, consists of 40 true-false items dealing with

beliefs and attitudes. (The first version by Rokeach is in multiple choice form.) The reliability (K-R 20) for 6289 male college freshmen was .77 and for 6143 female college freshmen was .75.

Student Orientation Survey, Form C. Farber and Goodstein (1964) developed four a priori scales to assess the student orientations implied in Trow's student typology (1960). These scales are Academic, Collegiate, Non-Conforming, and Vocational. The a priori scales were revised by an internal consistency item analysis to develop homogeneous, 10-item scales. Reliabilities (K-R 20) ranged from .39 to .45 for male college freshmen and from .36 to .50 for females.

Other Descriptive Information. Students were polled for their educational and economic aspirations, their life goals, and their self-ratings. They were also asked to indicate their choice of vocation and field of training, and to provide background information. Their high school grades and ACT scores were available from college records.

Students indicated the degree to which 35 different life goals and achievements were "essential, very important, somewhat important, or of little importance" (for example, being a religious person, making a contribution to scientific knowledge, being happy and content).

Using a list of 31 traits and abilities such as originality, scholarship, and conservatism, students rated their personal traits and abilities on a four-point scale--top 10%, above average, average, and below average.

Table 2 summarizes the reliability coefficients (K-R 20) for all descriptive scales and indicates the number of items in each scale. Generally, the scales possess moderate to high homogeneity. Scales with low coefficients are usually brief scales or scales with marked heterogeneity of content.

Table 2

Kuder-Richardson Reliabilities for the Descriptive Scales of the American College Survey

| Scale | No. of Items | | Reliability | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 1. Realistic | 14 | 14 | .85 | .77 |
| 2. Intellectual | 14 | 14 | .89 | .89 |
| 3 Social | 14 | 14 | .84 | .82 |
| 4. Conventional | 14 | 14 | .87 | .83 |
| 5. Enterprising | 14 | 14 | .83 | .76 |
| 6. Artistic | 14 | 14 | .88 | .88 |
| 7. Self-Control | 14 | 14 | .86 | .85 |
| 8. Aggressive | 14 | 14 | .84 | .83 |
| 9. Masculine | 14 | 14 | .57 | .50 |
| 10. Status | 14 | 14 | .71 | .60 |
| 11. Acquiescence | 30 | 30 | .76 | .76 |
| 12. Leadership Potential | 29 | 20 | .86 | .77 |
| 13. Literary Potential | 18 | 20 | .84 | .72 |
| 14. Artistic Potential | 20 | 24 | .79 | .85 |
| 15. Scientific Potential | 23 | 24 | .81 | .80 |
| 16. Musical Potential | 18 | 21 | .87 | .74 |
| 17. Dramatic Arts Potential | 18 | 23 | .77 | .82 |
| 18. Range of Experience | 76 | 76 | .92 | .90 |
| 19. Intellectual Home Resources | 39 | 39 | .81 | .78 |
| 20. Scientific Achievement | 15 | 15 | .80 | .81 |
| 21. Leadership Achievement | 14 | 14 | .72 | .65 |
| 22. Dramatic Arts Achievement | 13 | 13 | .75 | .72 |
| 23. Artistic Achievement | 12 | 12 | .84 | .81 |

Table 2 (cont.)

| Scale | No. of Items | | Reliability | |
|---|---|---|---|---|
| | Men | Women | Men | Women |
| 24. Literary Achievement | 8 | 8 | .73 | .70 |
| 25. Musical Achievement | 15 | 15 | .84 | .77 |
| 26. Total Competencies | 143 | 143 | .94 | .93 |
| 27. Scientific Competency | 11 | 11 | .79 | .67 |
| 28. Technical Competency | 23 | 23 | .83 | .76 |
| 29. Government & Social Studies Competency | 2 | 2 | .57 | .54 |
| 30. Athletic Competency | 11 | 11 | .71 | .70 |
| 31. Business & Clerical Competency | 5 | 5 | .48 | .38 |
| 32. Social & Educational Competency | 13 | 13 | .78 | .74 |
| 33. Homemaking Competency | 24 | 24 | .86 | .85 |
| 34. Arts Competency | 34 | 34 | .87 | .85 |
| 35. Leadership & Sales Competency | 12 | 12 | .80 | .79 |
| 36. Foreign Language Competency | 6 | 6 | .35 | .11 |
| 37. Preconscious Activity (Originality) | 38 | 38 | .72 | .68 |
| 38. Dogmatism | 40 | 40 | .77 | .75 |
| 39. Academic Type | 10 | 10 | .45 | .42 |
| 40. Vocational Type | 10 | 10 | .39 | .36 |
| 41. Non-Conformist Type | 10 | 10 | .42 | .43 |
| 42. Collegiate Type | 10 | 10 | .45 | .50 |
| 43. Interpersonal Competency | 20 | 20 | .69 | .67 |

Note. --This table is based on the total student samples of 6289 men and 6143 women.

## Fields of Study and Prospective Students

The fields of study and the number of students planning to major in each field are shown in Table 3. Fields with less than ten prospective students were eliminated from further study. Similarly, students who were undecided or who gave no response or unclassifiable responses were omitted.

Table 3

The Distribution of Students by Anticipated Major Field of Study

| Major Field | Men | Women | Major Field | Men | Women |
|---|---|---|---|---|---|
| Accounting | 273 | 44 | English, Creative Writing | 50 | 69 |
| Administration and Supervision | 8 | 2 | English Education | 88 | 342 |
| Aeronautical Engineering | 68 | 6 | Experimental and General Psych. | 28 | 28 |
| Agricultural Science | 193 | 18 | | | |
| Anthropology | 10 | 5 | | | |
| Architecture | 78 | 5 | Farming | 26 | 0 |
| Art | 56 | 108 | Finance | 76 | 8 |
| Art Education | 24 | 84 | Foreign Language Education | 18 | 103 |
| Astronomy, astrophysics | 10 | 2 | Foreign Service | 6 | 9 |
| | | | Forestry | 90 | 1 |
| Bio-chemistry | 23 | 4 | | | |
| Biology | 134 | 98 | General Humanities | 20 | 23 |
| Botany | 15 | 7 | General Social Sciences | 23 | 34 |
| Business Education | 24 | 94 | Geography | 19 | 6 |
| | | | Geology, geophysics | 23 | 3 |
| Chemical Engineering | 80 | 3 | | | |
| Chemistry | 144 | 42 | | | |
| Civil Engineering | 171 | 5 | | | |
| Clerical | 13 | 73 | | | |
| Clinical Psychology | 45 | 45 | History | 161 | 83 |
| Counseling & Guidance | 22 | 71 | History Education | 190 | 138 |
| | | | Home Economics | 6 | 235 |
| Dentistry | 95 | 35 | Home Economics Education | 3 | 139 |
| Drama | 18 | 18 | Housewife | 0 | 26 |
| | | | | | |
| Economics | 37 | 6 | | | |
| Education, General and Other | 28 | 31 | Industrial Arts Education | 56 | 0 |
| Education of Exceptional Children | 12 | 121 | Industrial Engineering | 32 | 0 |
| Educational Psychology | 16 | 41 | Industrial & personnel psychology | 16 | 5 |
| Electrical Engineering | 229 | 2 | | | |
| Elementary Education | 103 | 1353 | Journalism, Radio-TV, Communication | 54 | 55 |
| Engineering, General and Other | 99 | 4 | | | |
| Engineering Science | 42 | 2 | | | |

Table 3 (cont.)

| Major Field | Men | Women | Major Field | Men | Women |
|---|---|---|---|---|---|
| Law | 183 | 24 | Other health fields | 19 | 43 |
| Library Science | 1 | 19 | | | |
| Literature | 28 | 48 | Pharmacy | 45 | 10 |
| | | | Philosophy | 10 | 4 |
| Management | 339 | 27 | Physical Education, | | |
| Marketing | 55 | 11 | Rec., Health | 289 | 235 |
| Mathematics, | | | Physical Science, | | |
| Statistics | 123 | 71 | General & Other | 12 | 2 |
| Math Education | 160 | 133 | Physical Therapy | 7 | 25 |
| Mechanical | | | Physics | 79 | 10 |
| Engineering | 143 | 1 | Physiology | 17 | 7 |
| Medical Technology | 8 | 74 | Political Science | 139 | 55 |
| Medicine | 255 | 76 | Public Admini- | | |
| Metallurgical | | | stration | 14 | 1 |
| Engineering | 15 | 0 | Public Relations, | | |
| Metallurgy | 2 | 0 | Advertising | 25 | 8 |
| Meteorology | 0 | 2 | Purchasing | 8 | 37 |
| Military Science | 28 | 1 | | | |
| Modern Foreign | | | Sales | 45 | 22 |
| Language | 11 | 88 | Secretarial | | |
| Music | 48 | 58 | Science | 1 | 249 |
| Music Education | 61 | 68 | Social Work | 15 | 84 |
| | | | Sociology | 33 | 74 |
| Natural Science | | | Speech | 14 | 35 |
| Education | 64 | 27 | | | |
| No near equivalent | | | Theology, religion | 36 | 11 |
| in list | 276 | 241 | Trade & Industrial | | |
| Not full-time & not | | | Education | 29 | 2 |
| housewife | 1 | 4 | | | |
| Nursing | 6 | 285 | Undecided or don't | | |
| | | | know | 337 | 229 |
| Oceanography | 5 | 2 | | | |
| Other Biological | | | Veterinary | | |
| Sciences | 38 | 24 | Medicine | 110 | 15 |
| Other Business & | | | | | |
| Commercial | 48 | 20 | Zoology | 44 | 29 |
| Other Fine & Applied | | | | | |
| Arts | 4 | 10 | | | |

Note.--Samples of less than 10 for either sex were not used for this study; categories which do not represent specific fields were also omitted: "undecided, no near equivalent in list."

For each major field enrolling ten or more students (79 fields for men; 60 fields for women) the mean and standard deviation were computed for 117 student characteristics. It was assumed that the student characteristics significantly differentiated among the major fields. A partial test of this assumption was made by computing simple analyses of variance for 53 of the 117 student variables; statistically significant results were obtained for both sexes for 52 of these 53 variables. Only the self-rating of "self-sufficiency" failed to differentiate among major fields.

Rather than report all possible statistically significant findings, it was decided to report only the extreme findings. For this purpose, the fields with the highest and lowest means on each of the 117 characteristics were identified. A summary of these "extreme" characteristics was prepared for each major field. For each field the summary identified those characteristics for which students, planning a given major, averaged higher or lower than students planning any other major.

The major fields were then grouped into 13 conventional academic areas: physical sciences, biological sciences, humanities, social sciences, agriculture, business and administration, education, political science and law, health professions, engineering, creative arts, vocational and trade, and military science. For each academic area, a table was prepared to show the characteristics which were most descriptive of the major fields in that area.

The results are summarized in Tables 4 through 16. Each table

combines the characterizations of several related majors. While a given entry in a table applies only to a single major field in the group, it is assumed that the classification scheme is sufficiently homogeneous to permit generalization to all majors in the group. Since this assumption is not always tenable, a problem which most a priori classifications face, the following descriptions contain some inappropriate classifications and concomitant descriptive error.

The characteristics of students planning to major in each group of fields are summarized below.

Physical Sciences (astronomy, astrophysics, chemistry, physics, geography, geology, geophysics, mathematics, statistics, physical science, general and other)

When we look in Table 4 and review the findings literally, they suggest that men planning to major in the physical sciences have scientific interests, possess scientific potential, and have a record of scientific accomplishment in high school. They rate themselves, relative to their peers, as high on drive to achieve, math ability, scientific ability, intellectual self-confidence, and research ability. The following life goals and aspirations are important to potential physical scientists: inventing a useful product, becoming an authority in a special subject in their field, making their parents proud, making theoretical and technical contributions to science, and keeping in good physical condition.

In contrast, future male students in the physical sciences have

little interest in business, and few business and clerical competencies. They think of themselves as poor athletes, having little understanding of others, being shy and inexpressive, and lacking in cheerfulness and social self-confidence. They regard the following life goals as unimportant: following a formal religious code, being self-sufficient, producing good artistic work, becoming an accomplished musician, becoming an expert in finance and commerce, being a good spouse or parent, finding a real purpose in life, and being active in religious affairs.

Women aspiring to the physical sciences show a similar pattern of personal characteristics. Women are also likely to have lower psychosexual status; that is, they are more apt to be single, to be unengaged, to date different people, or to be dateless. Compared with women in other fields, they are more concerned about their future career than marriage.

Table 4

Student Characteristics associated with

the Choice of Physical Sciences

| High Means | |
|---|---|
| Men | Women |
| Scientific Potential | Scientific Potential |
| Scientific Achievement | Scientific Achievement |
| Academic Type | Academic Type |
| SR - mathematical ability | SR - mathematical ability |
| SR - scientific ability | SR - scientific ability |
| SR - research ability | SR - research ability |
| G - inventing or developing a useful product or device | G - inventing or developing a useful produce or device |
| G - theoretical contribution to science | G - theoretical contribution to science |

Table 4 (cont.)

High Means

| Men | Women |
|---|---|
| G - technical contribution to science | G - technical contribution to science |
| Intellectual (VPI) | Scientific Competency |
| SR - drive to achieve | SR - scholarship |
| SR - intellectual self-confidence | SR - independence |
| G - authority on special subject in my field | G - meaningful philosophy of life |
| G - making parents proud | G - exciting and stimulating activities |
| G - good physical condition | Satisfaction with College Choice |

Low Means

| Men | Women |
|---|---|
| SR - sociability | SR - sociability |
| SR - cheerfulness | SR - cheerfulness |
| SR - social self-confidence | SR - social self-confidence |
| G - good spouse | G - good spouse |
| G - good parent | G - good parent |
| Enterprising (VPI) | Leadership Potential |
| Business and Clerical Competency | SR - popularity |
| SR - athletic ability | G - making sacrifices for others |
| SR - understanding of others | G - becoming a community leader |
| SR - speaking ability | G - avoiding hard work |
| SR - self-control | Psycho-Sexual Status |
| SR - expressiveness | Importance of Finding a Suitable Mate |
| G - following formal religious code | |
| G - self-sufficient | |
| G - producing good artistic work | |
| G - becoming accomplished musician | |
| G - expert in finance and commerce | |
| G - finding a real purpose in life | |
| G - being active in religious affairs | |

Note. --On this and succeeding tables G = life goal or aspiration and SR = self-rating.

Biological Sciences (biology, bio-chemistry, botany, physiology, zoology, other biological fields)

The characteristics which differentiate the potential biological scientist from students in other major fields (Table 5) were few in number and relatively unclear in pattern. Both men and women regarded social welfare activities as unimportant as did the potential physical scientists, but the remaining findings did not hold for both sexes.

Table 5

Student Characteristics associated with

the Choice of Biological Sciences

| High Means | |
|---|---|
| Men | Women |
| Realistic (VPI) | SR - practical-mindedness |
| Range of Experiences | G - finding real purpose in life |
| Intellectual Home Resources | |
| Scientific Competency | |
| SR - conservatism | |
| G - avoiding hard work | |
| **Low Means** | |
| Men | Women |
| SR - writing ability | G - making parents proud |
| G - becoming happy and content | G - expert in finance and commerce |
| G - influential in public affairs | |
| G - becoming mature and well-adjusted | |

Engineering (aeronautical, civil, chemical, electrical, engineering science, industrial, mechanical, metallurgical, general and other)

The results for potential engineering students in Table 6 are consistent with previous studies and the stereotype of the engineer. Here he is characterized by his mechanical interests, his vocational orientation to college life, his desire to relax and enjoy life, and his claim of high mechanical ability. He has few social interests, and low artistic and literary achievement; he also does not aspire to write good fiction or to be well liked.

Table 6

Student Characteristics associated with

the Choice of Engineering

| High Means (Men) |
|---|
| Masculine (VPI) |
| Vocational Type |
| SR - mechanical ability |
| G - having time and means to relax and enjoy life |
| **Low Means (Men)** |
| Social (VPI) |
| Artistic Achievement |
| Literary Achievement |
| G - writing good fiction |
| G - being well-liked |

Health Professions (dentistry, medicine, nursing, pharmacy, physical therapy, veterinary medicine, medical technology, other health fields)

In Table 7, men interested in the health professions as a major are high on leadership achievement, total competencies, homemaking

competencies, and dogmatism. They expect to have a high income, and a high level of education, and the goal of being successful in their own business is important to them.

Women interested in the health professions in comparison with women planning to major in other fields see themselves as being more realistic, aggressive, masculine, and acquiescent. They feel that they have more drive to achieve than others. They are interested in being self-sufficient and being good parents.

Women in the health professions also see themselves as lacking in self-control; being low in literary or musical achievement; having few athletic, business and clerical, and social and educational competencies. They lack non-conforming and collegiate orientations, and they are low in interpersonal competency. Their expected vocational achievement in comparison with other women is low. They rate themselves low on athletic ability, understanding of others, speaking and writing ability, intellectual self-confidence, perseverance, popularity with the opposite sex, sense of humor, physical health, and sensitivity to the needs of others. They think that the following goals are unimportant: being happy and content, being an authority on a special subject in their field, following a formal religious code, having the time and means to relax and enjoy life, writing good fiction, being well-liked, being engaged in exciting and stimulating activities. Finally, women interested in the health professions tend to come from smaller high schools.

In general, these women seem to have few of the typical feminine characteristics--they claim few interests or competencies in cultural and social affairs; in addition, they seem less confident than women in other fields--they are acquiescent and rate themselves low in a variety of characteristics.

Table 7

Student Characteristics associated with

the Choice of Health Professions

| High Means | |
|---|---|
| Men | Women |
| Leadership Achievement | Realistic (VPI) |
| Total Competencies | Aggressive (VPI) |
| Homemaking Competencies | Masculine (VPI) |
| Dogmatism | Acquiescence (VPI) |
| Expected Income | SR - drive to achieve |
| Highest Level of Education | G - self-sufficient |
| G - successful in own business | G - good parent |

| Low Means | |
|---|---|
| Men | Women |
| Satisfaction with college choice | Self-Control (VPI) |
| | Literary Achievement |
| | Musical Achievement |
| | Athletic Competency |
| | Business and Clerical Competency |
| | Social and Educational Competency |
| | Non-Conformist Type |
| | Collegiate Type |
| | Interpersonal Competency |
| | Expected Vocational Achievement |
| | SR - athletic ability |
| | SR - understanding of others |
| | SR - speaking ability |

Table 7 (cont.)

| Low Means | Women |
|---|---|
| | SR - writing ability |
| | SR - intellectual self-confidence |
| | SR - perseverance |
| | SR - popularity with the opposite sex |
| | SR - sense of humor |
| | SR - physical health |
| | SR - sensitivity to the needs of others |
| | G - happy and content |
| | G - authority on special subject in my field |
| | G - formal religious code |
| | G - time and means to relax and enjoy life |
| | G - writing good fiction |
| | G - being well-liked |
| | G - exciting and stimulating activities |
| | Size of the High School Class |

Agriculture (agricultural science, forestry, farming)

In Table 8, the choice of agricultural fields by men is associated with low artistic interests, passivity, narrow range of vocational outlook, low scientific achievement, and graduation from a small high school. The potential agricultural major believes he has a poor sense of humor, and does not think the following goals are important: developing a meaningful philosophy of life, being well read, obtaining awards or recognition, avoiding hard work, and engaging in exciting and stimulating activities.

For women, agricultural choices are associated with many technical competencies and high self-ratings of mechanical ability. Women also

have low status interests and have little concern with such goals as: being influential in public affairs, becoming a mature and well-adjusted person, and keeping up-to-date politically.

Much of this description appears congruent with our knowledge of people from rural backgrounds: hard workers, less concern with status than urban residents, less interest in artistic matters and political affairs.

Table 8

Student Characteristics associated with

the Choice of Agriculture

| High Means | |
|---|---|
| Men | Women |
| | Technical Competency |
| | SR - mechanical ability |
| **Low Means** | |
| Men | Women |
| Status (VPI) | Status (VPI) |
| Artistic (VPI) | G - influential in public affairs |
| Aggressive (VPI) | G - mature and well-adjusted person |
| Scientific Achievement | G - up-to-date politically |
| Dramatic Arts Achievement | |
| SR - sense of humor | |
| G - meaningful philosophy of life | |
| G - being well-read | |
| G - obtaining awards or recognition | |
| G - avoiding hard work | |
| G - exciting and stimulating activities | |
| Size of High School Class | |

Education (elementary, English, foreign language, history, natural science, mathematics, physical, recreational, health, exceptional children, general and other)

Men planning to major in this area are high in foreign language competency (probably holds only for students with language interests), athletic ability, physical energy, and physical health. Being an outstanding athlete is an important goal for them, a finding which probably holds largely for physical education majors. They are low on intellectual interests, scientific competency, technical competency, and scholarship. They think that becoming an accomplished musician, producing good artistic work and having executive responsibility for the work of others are relatively unimportant goals.

The women present a similar pattern with the rather puzzling exception that intellectual interests are high rather than low. This finding probably holds only for natural science majors.

Table 9

Student Characteristics associated with

the Choice of Education Professions

| High Means | |
|---|---|
| Men | Women |
| SR - athletic ability | SR - athletic ability |
| SR - physical energy | SR - physical energy |
| SR - physical health | SR - physical health |
| G - outstanding athlete | G - outstanding athlete |
| Foreign Language Competency | Intellectual (VPI) |

Table 9 (cont.)

| High Means | |
|---|---|
| Men | Women |
| | Status (VPI)<br>Athletic Competency<br>G - good physical condition |
| **Low Means** | |
| Men | Women |
| Intellectual (VPI)<br>Scientific Competency<br>Technical Competency<br>SR - scholarship<br>G - becoming a community leader<br>G - good artistic work<br>G - executive responsibility | G - accomplished musician |

Social Sciences (counseling and guidance, educational psychology, clinical psychology, industrial and personnel psychology, experimental and general psychology, anthropology, sociology, social work, general social sciences)

The choice of the social sciences is associated with social interests, a non-conforming orientation to college life, and goals of becoming mature and well-adjusted, and becoming a good parent. Potential social science majors also tend to come from large high schools. The remaining student attributes in Table 10 do not hold for both sexes.

Table 10

Student Characteristics associated with

the Choice of Social Sciences

| High Means | |
|---|---|
| Men | Women |
| Social (VPI) | Social (VPI) |
| Non-Conformist Type | Non-Conformist Type |
| G - mature and well-adjusted | G - mature and well-adjusted |
| G - good parent | G - good parent |
| Size of High School Class | Size of High School Class |
| Self-Control (VPI) | G - good spouse |
| Social & Educational Competency | |
| SR - popularity | |
| SR - understanding of others | |
| SR - sensitivity to the needs of others | |
| G - becoming a community leader | |

| Low Means | |
|---|---|
| Men | Women |
| Expected Income | Musical Potential |
| G - helping others | Artistic Achievement |
| G - accomplished in performing arts | SR - conservatism |
| G - authority on special subject in my field | SR - practical-mindedness |
| G - making parents proud | |
| G - making sacrifices for others | |
| G - good physical condition | |
| G - expert in finance and commerce | |

Vocational and Trade (home economics education, business education, trade and industrial education, industrial arts education, library science, home economics, housewife)

Both sexes planning to enter vocational and trade fields regard becoming a good spouse as an important goal; both sexes lack literary, artistic, and dramatic arts potential and they report few foreign language competencies or achievements in leadership. This group is characterized by its almost explicit orientation toward marriage rather than career, an interpretation which is especially clear for women. They claim many homemaking competencies; they desire being happy and content, and becoming a good spouse and good parent. They see finding a suitable mate as an important goal in college attendance, and relative to other groups of students, they have the highest average psycho-sexual status score. Psycho-sexual status is defined here by a simple five step scale ranging from marriage, engaged, going steady, date different persons to don't date at all; the future vocational and trade students have a high average score, or they are more involved with the opposite sex than any of the other groups.

Table 11

Student Characteristics associated with

the Choice of Vocational and Trade Fields

| High Means | |
|---|---|
| Men | Women |
| G - good spouse | G - good spouse |
| Acquiescence (VPI) | Homemaking Competency |
| Technical Competency | G - becoming happy and content |
| | G - good parent |

Table 11 (cont.)

| Men | Women |
|---|---|
| **High Means** | |
| | Psycho-Sexual Status |
| | Finding Suitable Mate |
| **Low Means** | |
| Literary Potential | Literary Potential |
| Artistic Potential | Artistic Potential |
| Dramatic Arts Potential | Dramatic Arts Potential |
| Leadership Achievement | Leadership Achievement |
| Foreign Language Competency | Foreign Language Competency |
| Leadership Potential | Scientific Potential |
| Government and Social Studies Competency | Range of Experience |
| | Total Competencies |
| Arts Competency | Leadership and Sales Competency |
| SR - sensitivity to the needs of others | Expected Income |
| | SR - leadership |
| | SR - mechanical ability |
| | SR - drive to achieve |
| | SR - independence |
| | SR - perseverance |
| | SR - research ability |
| | SR - physical energy |
| | G - accomplished performer |
| | G - meaningful philosophy of life |
| | G - being well-read |
| | G - receiving awards or recognition |

Business and Administration (management, clerical, sales, finance, marketing, purchasing, economics, public relations, advertising, accounting, public administration, secretarial science, other business and commercial)

Both sexes planning to enter business and administrative fields are

characterized by their clerical and persuasive interests. They claim many business and clerical competencies and they possess a collegiate orientation to higher education. They hope to become well-off financially, to become experts in finance or commerce, to be well liked, to become good parents, and to achieve executive responsibility. In contrast, both sexes have achieved little in science in high school, have rated themselves low on originality, and have reported a non-academic orientation to college life. They also rate themselves low on scholarship, acting ability, and they do not value the production of good artistic work.

The results in Table 12 reinforce some of the stereotypes of people in the business and administrative fields.

Table 12

Student Characteristics associated with

the Choice of Business and Administration

| High Means | |
|---|---|
| Men | Women |
| Conventional (VPI) | Conventional (VPI) |
| Enterprising (VPI) | Enterprising (VPI) |
| Business and Clerical Competency | Business and Clerical Competency |
| Collegiate Type | Collegiate Type |
| G - well-off financially | G - well-off financially |
| G - being well-liked | G - being well-liked |
| G - good parent | G - good parent |
| G - executive responsibility | G - executive responsibility |
| G - expert in finance or commerce | G - expert in finance or commerce |
| Athletic Competency | Range of Experiences |
| SR - practical-mindedness | Leadership Achievement |
| G - becoming happy and content | Vocational Type |

Table 12 (cont.)

High Means

| Men | Women |
|---|---|
| G - following formal religious code | Expected Vocational Achievement |
| G - receiving awards or recognition | SR - understanding of others |
| G - self-sufficient | SR - conservatism |
| Satisfaction with College Choice | SR - perseverance |
| | G - making parents proud |
| | G - becoming a community leader |
| | G - good spouse |
| | G - successful in own business |

Low Means

| Men | Women |
|---|---|
| Scientific Achievement | Scientific Achievement |
| Preconscious Activity | Preconscious Activity |
| Academic Type | Academic Type |
| SR - scholarship | SR - scholarship |
| SR - scientific ability | SR - scientific ability |
| SR - acting ability | SR - acting ability |
| G - good artistic work | G - good artistic work |
| Scientific Potential | Intellectual (VPI) |
| Musical Potential | Artistic (VPI) |
| Musical Achievement | Acquiescence (VPI) |
| Total Competencies | Intellectual Home Resources |
| Athletic Competency | Dramatic Arts Achievement |
| Social and Educational Competency | Scientific Competency |
| Leadership & Sales Competency | Arts Competency |
| Interpersonal Competency | Highest Level of Education |
| Expected Vocational Achievement | SR - originality |
| SR - leadership | SR - artistic ability |
| SR - popularity | SR - aggressiveness |
| SR - drive to achieve | SR - self-control |
| SR - independence | SR - expressiveness |
| SR - practical-mindedness | G - becoming outstanding athlete |
| SR - intellectual self-confidence | G - self-sufficient |
| SR - perseverance | G - good physical condition |
| SR - popularity with opposite sex | G - real purpose in life |

Table 12 (cont.)

| Low Means | |
|---|---|
| Men | Women |
| SR - research ability<br>G - theoretical contribution to science | Consultation with Professional Person |

Political Science and Law

Men and women in these fields value being influential in public affairs and keeping up to date politically. Men appear to be more aggressive and concerned with their status than women, and women appear to have higher interpersonal competencies and more diverse competencies than men. Women also seek more education and income.

Table 13

Student Characteristics associated with

the Choice of Political Science and Law

| High Means | |
|---|---|
| Men | Women |
| G - influential in public affairs<br>G - up-to-date politically | G - influential in public affairs<br>G - up-to-date politically |
| Aggressive (VPI)<br>Status (VPI) | Total Competencies<br>Interpersonal Competency<br>Expected Income<br>Highest Level of Education<br>SR - cheerfulness<br>G - authority on special subject in my field |

Table 13 (cont.)

| Low Means | |
|---|---|
| Men | Women |
| Homemaking Competency | |

Creative Arts (art, speech, music education, art education. drama, literature, English, creative writing, music, journalism, other fine and applied arts)

Students planning to enter artistic fields are a well defined group relative to most of the educational groups discussed earlier. Both sexes have artistic interests; leadership, literary, musical and dramatic arts potentials as well as artistic achievements and competencies. Both sexes conceive of themselves as original, having leadership ability, artistic, agressive, having speaking ability, self-controlled, having writing ability, acting ability, and a sense of humor. Their life goals also reflect their interest in the arts.

Table 14

Student Characteristics associated with

the Choice of Creative Arts

| High Means | |
|---|---|
| Men | Women |
| Artistic (VPI) | Artistic (VPI) |
| Leadership Potential | Leadership Potential |
| Literary Potential | Literary Potential |

Table 14 (cont.)

High Means

| Men | Women |
|---|---|
| Artistic Potential | Artistic Potential |
| Musical Potential | Musical Potential |
| Dramatic Arts Potential | Dramatic Arts Potential |
| Dramatic Arts Achievement | Dramatic Arts Achievement |
| Artistic Achievement | Artistic Achievement |
| Literary Achievement | Literary Achievement |
| Musical Achievement | Musical Achievement |
| Arts Competency | Arts Competency |
| Leadership & Sales Competency | Leadership & Sales Competency |
| SR - originality | SR - originality |
| SR - sociability | SR - sociability |
| SR - artistic ability | SR - artistic ability |
| SR - aggressiveness | SR - aggressiveness |
| SR - speaking ability | SR - speaking ability |
| SR - self-control | SR - self-control |
| SR - writing ability | SR - writing ability |
| SR - social self-confidence | SR - social self-confidence |
| SR - sense of humor | SR - sense of humor |
| SR - acting ability | SR - acting ability |
| G - accomplished performer | G - accomplished performer |
| G - writing good fiction | G - writing good fiction |
| G - being well-read | G - being well-read |
| G - receiving awards or recognition | G - receiving awards or recognition |
| G - good artistic work | G - good artistic work |
| G - accomplished musician | G - accomplished musician |
| Interpersonal Competency | Intellectual Home Resources |
| SR - cheerfulness | Social and Educational Competency |
| SR - perseverance | Preconscious Activity |
| G - happy and content | Dogmatism |
| G - meaningful philosophy of life | SR - leadership |
| G - exciting and stimulating activities | SR - popularity |
| | SR - independence |
| | SR - expressiveness |
| | SR - intellectual self-confidence |
| | SR - popularity with opposite sex |
| | G - relaxing and enjoying life |
| | G - good spouse |
| | G - good parent |
| | G - finding real purpose in life |

Table 14 (cont.)

| Low Means | |
|---|---|
| Men | Women |
| Masculine (VPI) | Masculine (VPI) |
| G - inventing or developing useful product or device | G - inventing or developing useful produce or device |
| G - technical contribution to science | G - technical contribution to science |
| SR - mechanical ability | Social (VPI) |
| SR - mathematical ability | Aggressive (VPI) |
| SR - artistic ability | Government and Social Studies Competency |
| SR - conservatism | Dogmatism |
| SR - physical energy | Vocational Type |
| G - up-to-date politically | G - well-off financially |
| | G - helping others who are in difficulty |
| | G - theoretical contribution to science |
| | G - active in religious affairs |
| | G - executive responsibility |
| | G - successful in own business |
| | Satisfaction with College Choice |

Humanities (history, modern foreign language, philosophy, architecture, theology and religion, general humanities)

Students categorized as seeking fields in the humanities do not form a well-defined group. Only a few traits are identical for men and women: helping others, making sacrifices for others, being active religiously. Both sexes show little interest in realistic (mechanical and skilled trades) and conventional (clerical and business) vocations. The failure to attain a more reasonable concensus for humanities may be due to the variety of

fields now included in humanities.

Table 15

Student Characteristics associated with

the Choice of Humanities

| High Means | |
|---|---|
| Men | Women |
| Government and Social Studies Competency | Government and Social Studies Competency |
| G - helping others | G - helping others |
| G - making sacrifices for others | G - making sacrifices for others |
| G - active religiously | G - active religiously |
| Consultation with Professional Person | Consultation with Professional Person |
| Preconscious Activity | Self-Control (VPI) |
| Non-Conformist Type | Foreign Language Competency |
| Expected Vocational Achievement | SR - conservatism |
| SR - leadership | SR - sensitivity to the needs of others |
| SR - scholarship | G - becoming a community leader |
| SR - independence | G - following a formal religious code |
| SR - expressiveness | G - avoiding hard work |
| SR - popularity with opposite sex | G - good spouse |
| G - good parent | |
| G - finding real purpose in life | |
| Psycho-Sexual Status | |

| Low Means | |
|---|---|
| Men | Women |
| Realistic (VPI) | Realistic (VPI) |
| Conventional (VPI) | Conventional (VPI) |
| Acquiescence (VPI) | Enterprising (VPI) |
| Range of Experience | Technical Competency |
| Intellectual Home Resources | SR - mathematical ability |
| Homemaking Competency | |
| Dogmatism | |
| Vocational Type | |

Table 15 (cont.)

Low Means

| Men | Women |
|---|---|
| Non-Conformist Type | |
| Collegiate Type | |
| SR - artistic ability | |
| SR - aggressiveness | |
| SR - physical health | |
| G - well-off financially | |
| G - outstanding athlete | |
| G - formal religious code | |
| G - having time to relax and enjoy life | |
| G - good parent | |
| G - success in own business | |
| Psycho-Sexual Status | |
| Consultation with Professional Person | |
| Finding Suitable Mate | |

Military Science

The traits attributed to students in military science indicate that such students regard the finding of a suitable mate in college as an important goal. The "low" means imply that military science aspirants are impulsive, have low educational aspirations and see themselves as having little originality.

Table 16

Student Characteristics associated with the Choice of Military Science

| High Means (Men) |
|---|
| Importance of Finding Suitable Mate |

Table 16 (cont.)

| Low Means (Men) |
| --- |
| Self-Control (VPI) |
| Highest Level of Education |
| SR - originality |

## Individual Major Fields

Another way of looking at the information about students and their prospective major fields, is to identify the individual major fields which are highest and lowest on each of the 117 student variables. Table 17 was formed to show these relationships. For example, realistic interests (skilled trades and technical interests) are highest for future physiologists and lowest for future philosophy majors.

A review of this table generally lends validity to the meaning attributed to the various scales and ratings used in this study, and suggests an extensive number of hypotheses about students in different fields which can be examined in new research. Engineering majors have the most masculine interests; art education majors have the most feminine interests. On the average, bio-chemistry majors have the most intellectual resources in the home; theology and religion majors have the least. Social work majors have the most social and educational competencies; clerical majors have the least. Astronomy and astrophysics majors are highest on the academic orientation; public relations majors are lowest.

Table 17

The Major Fields with the Highest and Lowest

Mean Scores on 117 Variables

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 1. Realistic | Physiology | Philosophy | Vet. Medicine | Law |
| 2. Intellectual | Physics | Educ. of Exceptional Children | Nat. Science Education | Sales |
| 3. Social | Geography | Metal. Engr'ng | Counseling & Guidance | Other Fine & Applied Arts |
| 4. Conventional | Accounting | Philosophy | Accounting | Theology, Religion |
| 5. Enterprising | Public Relations | Astronomy, Astrophysics | Marketing | Theology, Religion |
| 6. Artistic | Literature | Farming | Drama | Clerical |
| 7. Self-Control | Educ'l Psychol. | Military Science | Theology, Religion | Vet. Medicine |
| 8. Aggressive | Political Science | Farming | Vet. Medic. | Other Fine & Applied Arts |
| 9. Masculine | Enginr'ng, Gen. & Other | Art Educ. | Vet. Medic. | Art Educ. |
| 10. Status | Political Science | Farming | History Education | Agricultural Science |
| 11. Acquiescence | Business Education | Philosophy | Vet. Medic. | Purchasing |
| 12. Leadership Potential | Speech | Trade & Indust'l Ed. | Speech | Chemistry |
| 13. Literary Potential | English, Creative Wtg. | Trade & Indust'l Ed. | English, Creative Wtg. | Business Education |
| 14. Artistic Potential | Art | Trade & Indust'l Ed. | Other Fine & Applied Arts | Business Education |
| 15. Scientific Potential | Physics | Clerical | Chemistry | Business Education |
| 16. Musical Potential | Music Education | Clerical | Music Education | Gen'l Social Science |
| 17. Dramatic Arts Pot'l | Drama | Trade & Indust'l Ed. | Drama | Business Education |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 18. Range of Experience | Bio-chem. | Modern Foreign Lang. | Other Business & Com'l | Business Education |
| 19. Intellectual Home Resources | Bio-chem. | Theology, Religion | Other Fine & Applied Arts | Accounting |
| 20. Scientific Achieve't | Physics | Clerical; Forestry | Physics | Clerical |
| 21. Leadership Achieve't | Other Health Fields | Trade & Indust'l Ed. | Marketing | Library Science |
| 22. Dramatic Arts Ach. | Drama | Forestry | Drama | Accounting |
| 23. Artistic Achieve't | Art | Chemical Enginr'g | Art Educ. | Exp'l & Gen'l Psychology |
| 24. Literary Achieve't | Literature | Industrial Enginr'g | Journalism, Communic. | Dentistry |
| 25. Musical Achieve't | Music Education | Clerical | Music | Pharmacy |
| 26. Total Competencies | Other Health Fields | Clerical | Law | Library Science |
| 27. Scientific Competency | Zoology | Foreign Lang. Educ. | Physics | Secretarial Science |
| 28. Technical Competency | Indust'l Arts Educ. | Foreign Lang. Educ. | Agricultural Science | Modern Foreign Language |
| 29. Gov't & Soc. St. Comp. | History | Trade & Indust'l Ed. | History | Other Fine & Applied Arts |
| 30. Athletic Comp. | Public Relations | Clerical | Phys. Ed., Recreation | Pharmacy |
| 31. Business & Clerical Comp. | Economics | Astronomy, Astrophysics | Other Business & Com'l | Pharmacy |
| 32. Social & Ed. Comp. | Social Work | Clerical | Drama | Vet. Medicine |
| 33. Homemaking Comp. | Other Health Fields | Philosophy | Home Econ. Education | Political Science |
| 34. Arts Comp. | Drama | Trade & Indust'l Ed. | Drama | Accounting |
| 35. Leadership & Sales Comp. | Journalism, Commun. | Clerical | Journalism, Commun. | Library Science |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 36. Foreign Lang. Comp. | Foreign Lang. Educ. | Trade & Indust'l Ed. | Modern Foreign Lang. | Business Education |
| 37. Precon-scious Act. | Philosophy | Accounting | Drama | Accounting |
| 38. Dogmatism | Other Health Fields | Philosophy | Speech | Literature |
| 39. Academic Type | Astronomy, Astro-physics | Public Relations | Physics | Other Business & Com'l |
| 40. Vocational Type | Metal. Engr'g | Philosophy | Clerical | Literature |
| 41. Non-Conformist Type | Anthropology; Philosophy | Theology, Religion | Exp. & Gen'l Psychology | Medical Technology |
| 42. Collegiate Type | Public Relations | Philosophy | Sales | Vet. Medicine |
| 43. Interpersonal Comp. | Drama | Clerical | Law | Other Health Fields |
| 44. Expected Income | Medicine | Social Work | Law | Housewife |
| 45. Expected Vocational Achievem't | Philosophy | Clerical | Marketing | Pharmacy |
| 46. Highest Level of Education | Vet. Medic. | Military Science | Law | Marketing |
| 47. SR - originality | Art | Military Science | English, Creat. Wrtg | Secretarial Science |
| 48. SR - leadership | Philosophy | Clerical | Drama | Library Science |
| 49. SR - mechanical ability | Mech'l Engr'g | Literature | Agricult'l Science | Library Science |
| 50. SR - popularity | Ind. & pers. Psychology | Clerical | Journalism, Commun. | Physics |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 51. SR - athletic ability | Phys. Ed., Recreation | Astronomy, Astrophysics | Phys. Ed., Recreation | Pharmacy |
| 52. SR - understanding of others | Ind. & Pers. Psychology | Physical Science, Gen. & Oth. | Marketing | Dentistry |
| 53. SR - drive to achieve | Chemistry | Clerical | Vet. Medic. | Library Science |
| 54. SR - math ability | Math, Statistics | Art | Math, Statistics | Theology, Religion |
| 55. SR - scholarship | Philosophy | Clerical; Ed. of Excep. Children | Physics | Clerical |
| 56. SR - sociability | Speech | Astronomy, Astrophysics | Journalism, Commun. | Physics |
| 57. SR - artistic ability | Art | Speech; Mod. Foreign Lang. | Art | Accounting |
| 58. SR - aggressiveness | Drama | Mod. Foreign Lang. | Drama | Accounting |
| 59. SR - speaking ability | Speech | Geography | Speech | Pharmacy |
| 60. SR - self-control | Drama | Geography | Other Fine & Applied Arts | Other Business & Com'l |
| 61. SR - independence | Philosophy | Clerical | Physics; Other Fine & Applied Arts | Library Science |
| 62. SR - scientific ability | Physics | Sales | Physics | Secretarial Science |
| 63. SR - conservatism | Botany | English, Creat. Wrtg | Marketing; Theology, Religion | Exp. & Gen. Psychology |
| 64. SR - practical-mindedness | Economics | Clerical | Other Biological Sciences | General Social Sciences |
| 65. SR - writing ability | English, Creat. Wrtg. | Botany | English, Creat. Wrtg. | Other Health Fields |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 66. SR - expressiveness | Philosophy | Geography | Journalism, Communication | Accounting |
| 67. SR - cheerfulness | Speech | Geography | Law | Physics |
| 68. SR - social self-confidence | Speech | Astronomy, Astrophysics | Journalism, Communication | Physics |
| 69. SR - intellectual self-confidence | Astronomy, Astrophysics | Clerical | Other Fine & Applied Arts | Pharmacy |
| 70. SR - perseverance | Drama | Clerical | Marketing | Pharmacy; Library Sci. |
| 71. SR - popularity with opposite sex | Philosophy | Clerical | Journalism, Communication | Pharmacy |
| 72. SR - research ability | Physics | Public Administration | Physics | Library Science |
| 73. SR - physical energy | Phys. Ed., Recreation | Music | Phys. Ed., Recreation | Library Science |
| 74. SR - sense of humor | Drama | Farming | Journalism, Commun. | Pharmacy |
| 75. SR - physical health | Phys. Ed., Recreation | Mod. Foreign Lang. | Phys. Ed., Recreation | Pharmacy |
| 76. SR - acting ability | Drama | Clerical | Drama | Accounting |
| 77. SR - sensitivity to needs of others | Ind. & Pers. Psychology | Trade & Indust'l Ed. | Theology, Religion | Dentistry |
| 78. G - happy and content | Speech; Public Administ'n | Bio-chemistry | Library Science | Pharmacy |
| 79. G - well-off financially | Public Relations | Theology, Religion | Marketing; Purchasing | Literature |
| 80. G - inventing useful product | Physical Science, Gen. & Oth. | Art Education | Physics | Literature |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 81. G - helping others | Theology, Religion | Anthropology | General Humanities | Other Fine & Applied Arts |
| 82. G - accomplished performer | Drama | Counseling & Guidance | Drama | Library Science |
| 83. G - meaningful philosophy of life | Literature | Farming | Physics | Business Education |
| 84. G - authority on special subject in field | Geology, Geophysics | Counseling & Guidance | Law | Pharmacy |
| 85. G - making parents proud | Geology, Geophysics | Anthropology | Purchasing | Other Biological Sciences |
| 86. G - outstanding athlete | Phys. Ed., Recreation | Mod. Foreign Lang. | Phys. Ed., Recreation | Marketing |
| 87. G - sacrifices for others | Theology, Religion | Anthropology | Theology, Religion | Physics |
| 88. G - community leader | Social Work | Foreign Language Education | Marketing; Theology, Religion | Physics |
| 89. G - influential in public affairs | Political Science | Botany | Law | Agricultural Science |
| 90. G - formal religious code | Clerical | Astronomy, Astrophysics; Philosophy | Theology, Religion | Vet. Medicine |
| 91. G - relaxing & enjoy life | Industrial Engineering | Theology, Religion | Drama | Vet. Medicine |
| 92. G - theoretical contrib. to science | Astronomy, Astrophysics | Sales | Physics | Drama |
| 93. G - technical contribution to science | Astronomy, Astrophysics | Art Education | Chemistry | Drama |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 94. G - writing good fiction | English, Creat. Wrtg | Metal. Engr'g | English Creat. Wrtg | Dentistry |
| 95. G - being well-read | Literature | Farming | Literature | Housewife |
| 96. G - mature & well-adjusted | Ind. & Pers. Psychology | Bio-chem. | Counseling & Guidance | Agricultural Science |
| 97. G - awards or recognition | Drama; Public Relations | Forestry | Drama | Library Science |
| 98. G - self-sufficient | Public Relations | Physical Science, Gen. & Oth. | Pharmacy | Marketing |
| 99. G - good physical condition | Geography | Educ'l Psychology | Phys. Ed., Recreation | Marketing |
| 100. G - good artistic work | Art Education | Math, Stat.; Math educ.; Accounting | Other Fine & Applied Arts | Accounting |
| 101. G - accomplished musician | Music Education | Physical Science, Gen. & Oth. | Music | Education, Gen'l and Other |
| 102. G - expert in finance & commerce | Finance | Astronomy, Astrophysics; Anthropology | Marketing | Zoology |
| 103. G - up-to-date politically | Political Science | Drama | Political Science | Agricultural Science |
| 104. G - being well-liked | Sales | Metal. Engrn'g | Sales | Vet. Medicine |
| 105. G - good spouse | Indust'l Arts Education | Astronomy, Astrophysics | Ed. Psych.; Other Fine & Applied Arts; Library Sci.; Theology, Relig.; Other Busn's & Com. | Physics |

Table 17 (cont.)

| Variable | Men | | Women | |
|---|---|---|---|---|
| | Highest | Lowest | Highest | Lowest |
| 106. G - good parent | Ind. & Pers. Psych.; Mod. Foreign Language; Public Administration | Astronomy, Astrophysics; Philosophy | Pharmacy; Marketing; Purchasing; Ed. Psych.; Drama; Oth. Fine & Apl'd Arts; Lib. Science | Physics |
| 107. G - real purpose in life | Theology, Religion | Astronomy, Astrophysics | Biology; Music | Management |
| 108. G - active religiously | Theology, Religion | Astronomy, Astrophysics | Theology, Religion | Literature |
| 109. G - executive responsibility | Marketing | Foreign Language Education | Marketing | Drama |
| 110. G - avoiding hard work | Other Biol. Sciences | Farming | Theology, Religion | Physics |
| 111. G - exciting activities | Speech | Farming | Physics | Pharmacy |
| 112. G - success in own business | Vet. Medic. | Philosophy | Sales | Literature |
| 113. Psycho-Sexual Status | Philosophy | Modern Foreign Language | Business Education | Physics |
| 114. Satisfaction with College | Public Admin. | Other Health Fields | Physics | Other Fine & Applied Arts |
| 115. Consultation with Prof'l Person | Theology, Religion | Modern Foreign Lang. | Theology, Religion | Other Business & Commercial |
| 116. Finding Suitable Mate | Military Science | Mod. Foreign Lang. | Housewife | Physics |
| 117. Size of High School Class | Ind. & Pers. Psychology | Farming | Clinical Psychology | Home Econ. Education |

## Variation Among Major Fields

The determination of the student characteristics with the greatest variation among fields is important for several purposes. Such knowledge reduces the number of student characteristics which we need to use in subsequent studies and identifies the descriptive variables which have practical value. To obtain this information, the results for the 117 descriptive variables were inspected for those variables which had the greatest variation across the 79 male and 60 female fields (the range of major field means divided by the standard deviation for the total population). Generally, the 53 variables with the greatest variation across fields were then retained for a simple analysis of variance. Some variables however were retained for this analysis so that every kind of variable could be sampled. For example, several self-ratings, life goals, and achievement scales were tested for significance, although they did not have great variability across fields.

All results--104 of the 106 analyses of variance--are statistically significant for both sexes at the .05 level. Table 18 presents these results.

Table 18

F-Tests for Selected Student Characteristics Across Major Fields

| Variable | Male | Female |
|---|---|---|
| 1. Realistic | 8.2634 | 3.1393 |
| 2. Intellectual | 14.9534 | 13.8275 |
| 3. Social | 15.6200 | 9.4283 |
| 4. Conventional | 20.9428 | 15.5927 |

Table 18 (cont.)

| Variable | Male | Female |
|---|---|---|
| 5. Enterprising | 13.4959 | 4.0178 |
| 6. Artistic | 14.6692 | 8.5810 |
| 9. Masculine | 15.2929 | 14.8763 |
| 10. Status | 16.5015 | 5.7575 |
| 15. Scientific Potential | 20.0021 | 10.4596 |
| 16. Musical Potential | 14.8835 | 6.3076 |
| 20. Scientific Achievement | 6.6625 | 5.1840 |
| 21. Leadership Achievement | 3.7817 | 3.1049 |
| 22. Dramatic Arts Achievement | 5.0290 | 4.6025 |
| 23. Artistic Achievement | 9.0857 | 15.9549 |
| 24. Literary Achievement | 6.3722 | 8.6520 |
| 25. Musical Achievement | 9.6726 | 7.7615 |
| 27. Scientific Competency | 8.2192 | 9.9205 |
| 34. Arts Competency | 9.2788 | 7.8114 |
| 35. Leadership & Sales Competency | 4.6765 | 3.0127 |
| 36. Foreign Language Competency | 6.9186 | 10.9722 |
| 37. Preconscious Activity (Originality) | 14.6986 | 12.3931 |
| 40. Vocational Type | 6.4408 | 6.5426 |
| 41. Non-Conformist Type | 2.9426 | 4.5023 |
| 44. Expected Income | 11.2693 | 6.9883 |
| 46. Highest Level of Education | 15.0875 | 9.3847 |
| 47. SR - originality | 5.4753 | 7.4794 |
| 49. SR - mechanical ability | 9.8215 | 4.1775 |
| 50. SR - popularity | 2.8505 | 2.0469 |
| 51. SR - athletic ability | 5.3742 | 8.7586 |
| 52. SR - understanding of others | 3.1775 | 2.8114 |
| 54. SR - mathematical ability | 19.2253 | 15.1181 |
| 57. SR - artistic ability | 10.3131 | 14.9868 |
| 59. SR - speaking ability | 6.1759 | 4.3282 |
| 60. SR - self-control | 1.6377 | 1.6365 |
| 62. SR - scientific ability | 23.5377 | 21.2334 |
| 63. SR - conservatism | 1.3665 | 1.7742 |
| 65. SR - writing ability | 7.0579 | 12.1473 |
| 72. SR - research ability | 6.8728 | 5.9010 |
| 76. SR - acting ability | 5.1678 | 4.6327 |

Table 18 (cont.)

| Variable | Male | Female |
|---|---|---|
| 79. G - well-off financially | 3.9867 | 1.8576 |
| 82. G - accomplished in performing arts | 10.2835 | 11.2188 |
| 86. G - outstanding athlete | 8.2758 | 11.4284 |
| 89. G - influential in public affairs | 5.6391 | 4.1683 |
| 92. G - theoretical contribution to science | 17.4459 | 13.1694 |
| 94. G - writing good fiction | 10.0247 | 15.9341 |
| 98. G - self-sufficient | 1.0982 | 1.2856 |
| 99. G - good physical condition | 2.3832 | 2.4671 |
| 100. G - good artistic work | 14.9914 | 22.6965 |
| 101. G - accomplished musician | 14.4689 | 16.1034 |
| 102. G - expert in finance & commerce | 21.0044 | 7.1154 |
| 103. G - up-to-date politically | 7.2092 | 4.8572 |
| 105. G - good spouse | 2.4952 | 1.8972 |
| 108. G - active in religious affairs | 3.3960 | 4.8378 |

Degrees of freedom
male: 79/6138
female: 60/5938

Significance levels
male: .05 = 1.28; .01 = 1.41
female: .05 = 1.32; .01 = 1.47

If the size of the F ratio is used as an index of the most discriminating variables, then the interest and life goals variables are generally most useful for the characterization of students in different major fields. If we consider different kinds of content rather than kinds of assessment devices, we find that variables of scientific, artistic, and business content are most discriminating.

## Discussion

Several cautions should be observed in the interpretation of the

results: Our students are aspirants for various major fields; they are not majors in various fields. The number of students in a given field varied from 10 to 1,353, so that some characterizations are more reliable than others. Finally, the use of the highest and lowest mean scores of the descriptive variables accentuates the characterization of students in various fields. Every field contains probably many students who differ from the typical student suggested here.

The descriptions of students seeking different fields imply, to a limited degree, that students know where they belong. They seek fields which are appropriate for their interests, values, and their special talents. Students with scientific accomplishment abilities, and interests seek scientific fields and at the same time they avoid fields which demand interpersonal competencies. Similar patterns of attraction and repulsion exist for most of the remaining areas of study. These results make clear that the process of making an educational decision is dependent upon a great range of student characteristics: interests, values, self-conceptions, competencies, achievements, range of experience, and family resources. Such outcomes suggest that students might be helped in their selection of a field of study by a broad self-examination for these same characteristics.

Since large proportions of students who say they plan to enter a field do enter that field, the present results may have some practical value (Strong, 1953). The descriptive variables are easily interpreted and are relatively free of psychological jargon so that it is possible in principle to

develop a self-scoring device which students could take and score themselves without the intervention of a counselor. Perhaps just reading the present report would be helpful to some students. If such simple techniques were constructive, they could serve many students who cannot make use of guidance workers either because they dislike the idea itself, or because counseling staffs are too small to serve all students. Faculty advisors should also find a reading of the present report helpful in their educational advising.

Generally, the characterizations of students seeking different fields is consistent with related studies by Cooley (1963), Davis (1964), Roe (1956), Darley and Hagenah (1955), Holland (1963) and others. Since most studies do not group students in identical fashion, precise correspondence among studies is rare.

In new studies, we plan to develop psychological classification schemes which will be useful for practice and research. The current conventional classifications lack psychological homogeneity so that membership in a group frequently has diffuse and even conflicting meaning. Other studies will be performed to learn how students who persist in a field differ from students who leave a field. In these long term studies we will be able to determine the predictive validities of the assessment devices used in this first study as well as the influence of various college climates upon a student's choice of field.

## References

Abe, C., Holland, J. L., Lutz, Sandra W., & Richards, J. M., Jr. A description of American college freshmen. ACT Research Report 01-65. Iowa City, Iowa: American College Testing Program, 1965.

Cooley, W. W. Career development of scientists. Cooperative Research Project No. 436, Office of Education, Graduate School of Education, Harvard Univer., 1963.

Darley, J. G., & Hagenah, Theda. Vocational interest measurement. Minneapolis: Univer. of Minnesota Press, 1955.

Davis, J. A. Undergraduate career decisions. Chicago: Aldine Publishing Co., 1964.

Farber, I. E., & Goodstein, L. D. Student Orientation Survey. Preliminary report, PHS research grant M-226, 1964.

Foote, N. N., & Cottrell, L. S. Identity and interpersonal competencies. Chicago: Univer. of Chicago Press, 1955.

Holland, J. L. A personality inventory employing occupational titles. J. appl. Psychol., 1958, 42, 336-342.

Holland, J. L. Some explorations of a theory of vocational choice and achievement: II. A four-year prediction study. Psychol. Rep., 1963, 12, 545-594. Southern Universities Press, 1963, Monograph Suppl. 4-V12.

Holland, J. L., & Nichols, R. C. Prediction of academic and extra-curricular achievement in college. J. educ. Psychol., 1964, 55, 55-65.

Nichols, R. C., & Holland, J. L. Prediction of the first year college performance of high aptitude students. Psychol. Monogr., 1963, 77, No. 7 (Whole No. 570).

Roe, Anne. The psychology of occupations. New York: Wiley, 1956.

Strong, E. K., Jr. Validity of occupational choice. Educ. Psychol. Measmt, 1953, 13, 110-121.

Trow, M. The campus viewed as a culture. In H. T. Sprague (Ed.), Research on college students. Boulder, Colorado: Western Interstate Commission for Higher Education, 1960.