Factors related to black students not selecting science as a major

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Abstract
Science is a field of study in which the proportion of blacks is drastically lower than that of the entire population (Humphries, 1976). Various studies have been conducted to investigate the characteristics associated with persons in the sciences (Flakes, 1973). There have also been recent studies of blacks in the sciences and the characteristics associated with them (Tilford, 1974). However, this research has not yet revealed why black students do not major in the fields of physical and biological science.
FACTORS RELATED TO BLACK STUDENTS NOT SELECTING SCIENCE AS A MAJOR

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CHAPTER I

THE PROBLEM

Science is a field of study in which the proportion of blacks is drastically lower than that of the entire population (Humphries, 1976). Various studies have been conducted to inves­tigate the characteristics associated with persons in the sciences (Flakes, 1973). There have also been recent studies of blacks in the sciences and the characteristics associated with them (Tilford, 1974). However, this research has not yet revealed why black students do not major in the fields of physical and biological science.

Statement of the Problem

The purpose of this study is to examine some of the factors that relate to black students' selections of majors. Three lines of inquiry guided the study. They are: the possibility that black students lack encouragement from peers, friends, parents, high school teachers and/or guidance counselors, etc.; (2) the possibility that these same students lacked previous exposure to coursework in the areas of math and science; (3) the possibility that the adequacy of instruction in their coursework in math and science may have produced negative attitudes in these students, influencing them away from selecting science as a major. However, if someone lacks motivation whether it is related to poor ability or no encouragement, negative attitudes can be developed. Skills are thus defined
as knowledge attained and the exposure gained in the areas of math and science and; attitudes are defined as the students' perception of instruction and encouragement received. Therefore, this study will attempt to examine black students' skills and attitudes in relation to their choice of a college major.

Importance of the Study

High school mathematics and science instruction is one of the most important potential forces for the encouragement of scientific careers. This could possibly be one of the factors that contribute to the lack of minority participation in the sciences. However, even fewer black students are being stimulated by the present-day instruction to pursue the study of science further. Sometimes the interest of a student in science can be displaced because of the manner in which a course was taught. Therefore, excellent teaching can be effective in stimulating and inspiring a student to further his career in science.

The opportunities in science and science related areas are opening to minorities; large numbers of minorities are being advised and/or directed into other areas of specialization. The development of special interest programs is thus greatly needed to increase the interest in science of high school students before they enter into a college and also to increase the amount of encouragement that is needed to guide students to the sciences in a college or university.
Assumptions

The assumption — that exposure and/or low scoring high school science and mathematic courses has affected black students in deciding against science majors — is made. Also, it is assumed the students were not encouraged to pursue careers in the sciences. Finally, the method in which they were taught might not have been sufficient enough for them.

Limitations of the Study

This study will deal with the present spring 1980 enrollment of black students living on-campus at the University of Northern Iowa. Therefore the applicability of this study to other predominantly white universities may be limited. This is basically due to the fact that the majority of the black students enrolled at this University come through the Educational Opportunity Program. Some of the students enrolled in the program have scored low on their ACT's or have slightly lower high school grade point averages than the other students enrolled at UNI. This program allows students to obtain a higher education under certain conditions. For instance, taking a limited course load is an option for EOP students at this particular time.

Definition of Terms

Black

Native Afro-Americans.

Educational Opportunity Program (EOP)

A program designed specifically to meet the educational, social and financial needs of low income and minority
group students; and furthermore to aid these students in the successful completion of a college career.

Non-science major
A student whose major field of study does not require the taking of a course in biology, physics, chemistry, or mathematics beyond the introductory level.

Science major
A student whose major field of study is chemistry, biology, mathematics, pre-medicine, pre-dentistry, or engineering.
CHAPTER 2
REVIEW OF RELATED LITERATURE

Adequate training in high school is an important factor in later major selection and success. Work has been done to investigate the reasons underlying the underrepresentation of minority groups in scientific fields. In a study done at Wayne State in 1978, a questionnaire was developed and administered to 474 juniors and seniors in seven disciplines: physical science, life science, engineering, social science, humanities, education, and business. The population was further subdivided into eight groups for data analysis based on sex, race, and major field of study. The study focused primarily on the multitude of variables contributing to the development of career decisions during the college years. These variables were divided up into four sections: (1) students' college experience, (2) factors influencing students' career selections, (3) family background factors and the elementary and high school years, and (4) student biographical data.

It seems reasonable to assume that with inadequate science or math courses in secondary schools, students are not going to become excited about the sciences (Sie, 1978). Therefore a good mathematics background is considered to be an important prerequisite to science careers. However, Sie found more black than white students enrolled in a general course of study even though 50 percent of the black students took college preparatory curriculum. Sie also notes that of the twenty-four black science
majors, thirteen went to Cass Technical High School in Detroit where science is emphasized. Thus a good background in both science and math courses are necessary skills for a science career.

Some considerations for factors related to a career selection have been studied. Sie (1978) stated that students felt an occupation should be, first, satisfying to themselves, second, satisfying to their spouse, and lastly, satisfying to their parents. Attention was also made to "interesting work", security for self and family, and a greater concern for future security for the black student.

Pentecoste did a study on the relationship of family occupational level to perceptions of the world of work. He investigated 180 ninth-grade, inner-city pupils from two inner-city schools in one school district located in a low-income black, Chicago community. He states that students in the high-occupational-level group want to work with ideas rather than objects and want to develop their own creations. They want good opportunities for vertical mobility and ample opportunity to use their abilities and develop personally. The rewards wanted by students in this high level are more personal than financial, but they want to feel secure in whatever they do. The medium-occupational-level group desires to develop new ideas and be creative, to achieve status and recognition through work and to have adequate leisure time to enjoy life. The lower-occupational-level group was concerned about the location and physical environment in which
the work was going to be performed, the verbal numerical, spatial and manual skills required in the job and the physical abilities needed for different jobs. These students were also concerned with monetary rewards and the type of environment. Primarily the black students fell in this lower-occupational-level group. Pentecoste (1975) concluded that inner-city children differ in their perceptions of the world of work depending on the occupational level of their families.

Goal attainment which Kerckhoff labeled fatalism was more important, and parental education much less important in exploring the educational ambition of blacks than of whites (Kerckhoff, 1977). Kerckhoff collected his data in 1969 in Fort Wayne, Indiana of all the twelfth grade boys in the Fort Wayne community school system. His findings clearly suggest that the mother is a strong source of influence in goal setting among black boys, even in families where the father is present. Fatalism is more strongly associated with both high and low socio-economic status measures and with ability at both status levels in the white sample than it is among the blacks (Kerckhoff, 1977). He states that fatalism is less highly correlated with other predictors for blacks than whites and that together with its higher correlation with ambition for blacks than whites, the results is its being the single best predictor of black ambition. He states that different models of educational ambition are needed for blacks than for whites and that relationships for whites do not appear to be linear.
Stephenson submitted a questionnaire to 1,000 ninth grade students in four, semi-industrial, medium sized communities in New Jersey. The data obtained from these questionnaires were tabulated so that comparisons of plans and aspirations at occupational group levels might be made. He accomplished this by classifying the fathers' occupations and the students' occupational plans and aspirations in accordance with the six principal groups presented in the Alba Edwards scale of occupational categories: I. Professionals; II. Owners, managers, and officials; III. Clerks and kindred workers; IV. Skilled workers and foremen; V. Semi-skilled workers; VI. Unskilled workers.

There were no black fathers in Group I and II and 3 in Groups II and III. The black students tended to plan lower than whites at each of their fathers' occupational Groups, but their aspirations were uniformly high. Stephenson states this lowered planning was expressed also in their educational plans and curriculum choice at each Group level. Thus, in their plans black students tended not only to reflect their "class" position, but their "caste" position as well (Stephenson, 1957).

Evidence can clearly be seen that black students do not frequently major in the sciences. This possibly could mean these students prefer courses in psychology and speech as well as in English and non-science subjects in considering later careers (Sie, 1978): The question can still be raised as to whether the above courses may be seen as less challenging and
less rigorous and therefore giving a better chance of success than other courses in the physical or biological sciences.

Atelsek and Gomberg conducted a study of 539 institutions in 1974 across the United States to find out the areas in which bachelor's degrees were awarded to minority students. They found blacks were awarded an above-average proportion of degrees in the fields of education, social sciences, and social work, but were underrepresented in physical sciences, engineering, and arts and humanities (Atelsek, 1977).

The study done by William Boyd (1974), a nationwide survey of black students in 1972-73, relates to the career interest of black students in higher education. This study of black undergraduates in white colleges was based on 979 completed interviews at forty four-year colleges and universities in the continental United States. The demographic locations included the Northeast, Midwest, South, and West regions. His book entitled, *Desegregating America's Colleges* reports that the career plan of blacks on white college campuses have a traditional focus. Boyd found that only a total of eight percent of black students majored in both the biological and physical sciences as listed in the table below.
<table>
<thead>
<tr>
<th>College Major</th>
<th>Percentage of Black Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Sciences</td>
<td>28</td>
</tr>
<tr>
<td>Business</td>
<td>15</td>
</tr>
<tr>
<td>Education</td>
<td>15</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>6</td>
</tr>
<tr>
<td>English</td>
<td>4</td>
</tr>
<tr>
<td>Engineering and Math</td>
<td>4</td>
</tr>
<tr>
<td>Physical Sciences</td>
<td>2</td>
</tr>
<tr>
<td>Black Studies</td>
<td>1</td>
</tr>
</tbody>
</table>

In an essay done by English and Settle (1976), it was stated that minorities are underrepresented among the various fields of study, with the exception of the social sciences and education. To further enhance this statement, another study by the Institute for the Study of Educational Policy (1976) conducted research that concluded blacks tended to move into educational fields and away from technical and scientific fields. However, this study states that blacks held equal or higher aspirations than whites, but that they fell below the standards because of categorical, educational, and psychosocial barriers. Hardy (1974) states the choice of science as a career is most likely among middle-and-upperclass students, and if a child's parent or relative or close neighbor is a scientist, the probability will increase that he or she will select a science profession.
Further studies indicate other variables that might affect career selection. They include such things as career orientation, counseling, expectations, persistence, access to powerful models, image of science, early exposure to science, and (science) projects (Rowe, 1977). Rowe (1977) speculates about these proposed relevant factors:

**Career orientation** - Counselors and teachers are an important gate to opportunity since they can inform students and their parents about career opportunities, training requirements, prospects for promotion, and so on.

**Course counseling** - A background which includes four years of high school mathematics increases the chances that a student will survive a rigorous college science program.

**Expectations** - Expectations of poor performance may beget poor performance.

**Persistence** - Interestingly, successful scientists tend to have a stronger sense of fate control than do less successful scientists.

**Access to powerful models** - Examples of blacks who are teaching science, doing scientific research, and "making it" in the sciences are not yet so numerous that young blacks meet them frequently through the media, through club activities, or as project advisors.

**Image of science** - How do minority students and their
parents view scientists and science? Is science seen as a vehicle for mobility, for acquiring influence, for making money, for doing well?

Early exposure to science - Because blacks have relatively fewer role models, it may be especially important for young blacks in elementary schools to have early and extensive exposure to soundly conceived, activity-based science programs.

Projects - Would investigative science projects be equally appealing to young blacks?

Tilford and Allen surveyed 1,006 black students in three predominantly black colleges in three states, including science and non-science majors, using a questionnaire as the survey instrument. In summarizing the discussion on characteristics associated with blacks in the sciences, Tilford and Allen (1974) conclude: science fields attract black college students of greater academic ability and achievement than non-science fields; non-science majors are influenced by family members in their choice of major field to a greater degree than science majors; and students perceive their high school teachers as an important influence on their choice of major field.

However, the aspirations of black students play an important role in their college enrollment (Nolle, 1973). Yet Holmstrom, Knepper and Kent (1977) state that Hispanic-Americans and Blacks seemingly possess the necessary interests and goals and values, but appear to be at a disadvantage because of their relatively
precarious financial positions and lack of confidence in their academic ability. Minorities were overrepresented in less demanding health fields and were found particularly likely to work in rather menial jobs. Because of this situation, many minority students may feel that health professions can only lead to positions such as nurses aides, orderlies, and attendants (Holmstrom, Knepper and Kent, 1977). Thus increased counseling and career information is necessary to overcome these feelings so that the number of minorities in the health fields will rise.

The possession of quantitative aptitude is generally believed to be associated to the scientific fields. Often, quantitative thinking is considered a basis for science ability. Super and Bachrach assigned general traits to the natural scientist. One of the traits is that of quantitative aptitudes. They state that the natural scientist's quantitative aptitudes are superior. Also it is noted that the natural scientist's ability to formulate problems mathematically and to think quantitatively, is generally well above average. Super and Bachrach (1957) regard the intellectual capacity of a scientist to include rigorous and abstract thinking and a high level of achievement. This idea therefore goes back to student's need to have a strong science and mathematics background in order to select science as a major. In a nationwide survey of black students in 1972–73, Boyd (1974) found that black students felt they were inadequately prepared in these areas (See Table 2).
Table 2

<table>
<thead>
<tr>
<th>Areas of Inadequate Preparation</th>
<th>Percentages of Black Students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>49</td>
</tr>
<tr>
<td>Science</td>
<td>37</td>
</tr>
<tr>
<td>English</td>
<td>34</td>
</tr>
<tr>
<td>Study Habits</td>
<td>17</td>
</tr>
<tr>
<td>All Areas</td>
<td>17</td>
</tr>
<tr>
<td>Writing</td>
<td>15</td>
</tr>
<tr>
<td>Reading</td>
<td>13</td>
</tr>
</tbody>
</table>

Bloom (1953) states science teachers should make the potential scientist aware of possibilities in the fields of science. He states they must provide him with a variety of experiences which will bring out his latent talents and encourage him to work to capacity. Furthermore, he states they must provide him with the knowledge and appreciation of science and the scientific method with challenging situations. Finally Bloom concludes the potential scientist must be caught early in his school experience.

Thus it is safe to assume that the lack of proper instruction does affect students in deciding upon a major in the sciences. Data (Boyd, 1974) indicates black students rated their high school preparation as inadequate; and that if they could do it over again they would prepare differently so that they eliminate deficiencies in their high school experience. Table 2
shows the inadequacy of college preparation as seen by black students, most especially in mathematics and science.

However, few students go through college without experiencing some academic difficulties, probably relating to inadequacies in some phases of their high school preparation (Jones, Harris and Hauck, 1975). This study was among 195 black students in four predominantly black universities and 94 black students in five predominantly white liberal arts colleges. The purpose of this study was to determine whether black students attending predominantly white colleges attributed their academic difficulties to different sources and saw themselves as having a different set of problems than their black counterparts in predominantly black colleges. The data indicated, black students in predominantly white schools rated their high school preparation as less adequate than did students in predominantly black schools (p. .05).

As stated by William Boyd (1974), black students continue to follow paths which traditionally have been open to them and which do not penalize them greatly for weaknesses in their preparation (See Table 1). Therefore, remediation programs should be designed to aid students who possess an interest in the sciences, without holding penalty against them. Or a cooperative model should be developed to increase minority participation in science (Smith, 1978). Dow Chemical, Hampton Institute (a historically Black college), and the NASA Langley Research Center organized and implemented a three-day conference
within the Division of Natural Sciences of Hampton Institute. This model was designed so that persons could become actively involved in the development and sharing of curriculum and career orientation materials, innovative counseling techniques, and models which would hopefully direct more persons into science. And perhaps as Bloom (1953) has stated, when we find someone who is competent and has demonstrated interest in science, then he should be encouraged to follow these interests vocationally.
CHAPTER 3
DESIGN OF THE STUDY

The names of all students presently enrolled in the E.O.P. Program at the University of Northern Iowa for the 1980 spring semester were supplied by the E.O.P. office. The E.O.P. address list for the 1980 spring semester consisted of 161 names, student identification numbers, addresses, and telephone numbers.

It was necessary to inquire about the race of each of the students on the list because all of the students enrolled in the E.O.P. Program were not black, but consisted of other minorities as well. In order to obtain the desired sample two E.O.P. advisors were contacted who identified 50 black students who lived on campus. This identification process concluded the search for the sample population.

A letter was sent to each of the fifty black, on-campus E.O.P. students explaining the purpose of the study and requesting them to attend a meeting at the Culture House where the questionnaires would be administered to the group. In order to prevent biased answers from the students, the exact title of the research paper was not revealed. Only sixteen students attended this meeting, therefore I personally contacted and individually administered the questionnaire to eight more students who were absent when the questionnaire was group administered. The remaining twenty-six students received questionnaires in the mail; twelve responded to this mailing. All of the students that chose to be a part of this survey were assured anonymity.
The students were asked questions pertaining to their science and mathematic backgrounds, their perception of the course instruction in the areas of math and science, and whether or not they received any encouragement to pursue a career in the sciences. They were also asked if their performance in these courses aided them in deciding upon their undergraduate majors. From these types of questions I was looking for similarities in the characteristics of these individuals with respect to high school grades and their feelings and attitudes towards the field of science and mathematics.

Upon completion and return of the questionnaires from these selected E.O.F. students, this information was compiled and conclusions were drawn as to some possible reasons black students do not major in the sciences at UNI.
CHAPTER 4
ANALYSIS OF THE DATA AND CONCLUSIONS

The three methods of data collection using a questionnaire were: (1) group administering, (2) individual contacting, and (3) mailing which produced a total of 36 responses from the 50 black students in the original sample population. By using these methods of collecting the data, a fairly high percentage of returns resulted (72%).

All respondents were black, undergraduate, resident students enrolled at UNI for the spring semester of 1980. These student's individual classifications were not requested on the questionnaire; however it is believed most of the population were sophomores and juniors.

This study focuses on some of the factors that relate to black students' selection of majors. It is the purpose of this study to research the idea of what causes black students not to major in the sciences. Thus this survey instrument (Appendix B) was designed to specifically answer questions in the following areas: (1) did exposure and/or low scoring in high school science and mathematic courses affect black students in deciding upon their non-science majors; (2) was there a lack of encouragement given to those students to pursue careers in the sciences, and (3) was the adequacy of instruction sufficient enough for them?

Table 3 shows the relationship of each question on the survey instrument (questionnaire) to the specific assumption
which it refers.

Table 3

<table>
<thead>
<tr>
<th>Assumption #1</th>
<th>Assumption #2</th>
<th>Assumption #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exposure and/or low scoring in high school science and mathematic courses</td>
<td>Lack of encouragement</td>
<td>Adequacy of instruction</td>
</tr>
</tbody>
</table>

Related Questions

<table>
<thead>
<tr>
<th>Related Questions</th>
<th>Related Questions</th>
<th>Related Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>24, 25, 26, 27, 28, 29, 30</td>
<td>13, 14, 15, 16, 17, 23, 34, 26</td>
<td>29, 30, 31, 32, 33, 35</td>
</tr>
</tbody>
</table>

General information about the students and their family's backgrounds were obtained in questions 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 18, 19, 20, 21, and 22. Eighty-one percent of the students surveyed were between the ages of 18 to 22. Seventeen percent of the students were 38. The sex of the students was relatively evenly distributed; 19 students in the sample population were male and the other 17 students were female.

The greatest number of the students concentrated in the area of Social Science, which represented 31 percent of the students in the sample population. Majors in the other areas were: Business - 22 percent; Humanities - 17 percent; Education - 14 percent; and Natural Science - 17 percent.

It also must be noted that 92 percent of the students (question 4) felt their decision upon a major was a conscientious choice requiring plenty of thought and consideration. Thirty-six
percent of students (question 5) stated that previous experience (related coursework) was a factor that aided them in making a decision upon a college major. Another 36 percent stated that future expectations (salary, job satisfaction, etc.) aided them with their decision of a major (question 5). Combined factors that aided the students in their decision were: suggestions from family peers and friends (11%); previous experience and future expectations (50%); future expectations and suggestions from family, peers and friends (5%); and previous experience, future expectations and suggestions from family, peers and friends (3%). The other 4 percent stated they had a personal interest in the major and that the Veterans Administration suggested they attend college.

In question 18, 53 percent of the students answered that UNI did not provide a special program such as EOP that interested them. However, 89 percent of the students received a scholarship or financial arrangements were made for them (question 19). The financial picture of these students suggests they are in the lower income bracket based on their financial needs. Eighty-one percent of these students answered that less than 50% of their college expenses are paid by their parents and 61% of these students answered that more than 50% of their college education is covered by a scholarship or other financial aid.

Boyd (1974) states that students from families with higher incomes are more likely to have parents who attended college.
Fifty-three percent of the students answering the questionnaire (question 6) had parents that did not go to college. The occupations of these students' fathers ranged from engineers, superintendents of schools and accountants to factory workers, fire captains and meat cutters. The mothers' occupations were just as varied, however, they tended to be maintained in the usual traditional roles of women. Their occupations ranged from assistant principals, insurance brokers and social workers to teachers, nurses and cosmetologists.

Table 4

<table>
<thead>
<tr>
<th>Father's Occupations</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laborers/Factory workers</td>
<td>19</td>
</tr>
<tr>
<td>Engineers</td>
<td>8</td>
</tr>
<tr>
<td>Managers</td>
<td>8</td>
</tr>
<tr>
<td>Supervisors</td>
<td>5</td>
</tr>
<tr>
<td>Meat Cutters and Butchers</td>
<td>5</td>
</tr>
<tr>
<td>Retired</td>
<td>5</td>
</tr>
<tr>
<td>Unemployed</td>
<td>5</td>
</tr>
<tr>
<td>Didn't know</td>
<td>5</td>
</tr>
<tr>
<td>Accountants</td>
<td>3</td>
</tr>
<tr>
<td>Deceased</td>
<td>3</td>
</tr>
<tr>
<td>Disabled</td>
<td>3</td>
</tr>
<tr>
<td>Dye Casters</td>
<td>3</td>
</tr>
<tr>
<td>Fire Captains</td>
<td>3</td>
</tr>
<tr>
<td>Floral Attendants</td>
<td>3</td>
</tr>
<tr>
<td>Photo Engraver</td>
<td>3</td>
</tr>
<tr>
<td>Plumbers</td>
<td>3</td>
</tr>
<tr>
<td>Prison Counselor</td>
<td>3</td>
</tr>
<tr>
<td>Receiving Inspectors</td>
<td>3</td>
</tr>
<tr>
<td>Superintendent of Schools</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 5

<table>
<thead>
<tr>
<th>Mother's Occupations</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homemakers</td>
<td>17</td>
</tr>
<tr>
<td>Laborers/Factory Workers</td>
<td>17</td>
</tr>
<tr>
<td>Teachers</td>
<td>14</td>
</tr>
<tr>
<td>Nurses</td>
<td>11</td>
</tr>
<tr>
<td>Unemployed</td>
<td>8</td>
</tr>
<tr>
<td>Cooks</td>
<td>5</td>
</tr>
<tr>
<td>Teacher's Aides</td>
<td>5</td>
</tr>
<tr>
<td>Waitresses</td>
<td>5</td>
</tr>
<tr>
<td>Assistant Principal</td>
<td>3</td>
</tr>
<tr>
<td>Bond Inspectors (Bank)</td>
<td>3</td>
</tr>
<tr>
<td>Caterers</td>
<td>3</td>
</tr>
<tr>
<td>Cosmetologists</td>
<td>3</td>
</tr>
<tr>
<td>Deceased</td>
<td>3</td>
</tr>
<tr>
<td>Insurance Brokers</td>
<td>3</td>
</tr>
<tr>
<td>Mail Clerks</td>
<td>3</td>
</tr>
<tr>
<td>Social Worker</td>
<td>3</td>
</tr>
<tr>
<td>Supervisor (Social Services)</td>
<td>3</td>
</tr>
</tbody>
</table>

The chances seem to be greater for black students attending college if an older brother or sister went to college before them. Fifty percent of the students answered yes to question 10 that an older brother or sister attended college before them and seven percent answered they had no older brothers or sisters. The occupation's of the black students' brothers consisted of accountants, engineers, insurance salesman, and personnel interviewer. These black student's sister's occupations encompassed nursing, office worker, laboratory assistant, recreational director, secretary, and receptionist.
Seventy-five percent of the students responding to the questionnaire acknowledged their desire of always having wanted to go to college. However, finances seem to influence their decision because only 50 percent of the students would have gone to college in the absence of a scholarship or other financial aid.

When asked if: their family expected them to go to college (question 13), 75% answered yes; high school teachers or counselors expected them to go to college (question 14), 78% answered yes; community leaders expected them to go to college (question 16), 72% answered yes; and family friends expected them to go to college (question 17), 81% answered yes. Although family, family friends, community leaders, counselors, and teachers' expectations seem to influence these students to carry-out these expectations; peer influence as usual affected their

---

Table 6

<table>
<thead>
<tr>
<th>Occupations of Siblings Who Attended College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accountant</td>
</tr>
<tr>
<td>Collection's Agent</td>
</tr>
<tr>
<td>Engineer</td>
</tr>
<tr>
<td>Insurance Salesman</td>
</tr>
<tr>
<td>Laborer</td>
</tr>
<tr>
<td>Laboratory Assistant (Computer Science)</td>
</tr>
<tr>
<td>Nurse</td>
</tr>
<tr>
<td>Office Worker</td>
</tr>
<tr>
<td>Receptionist</td>
</tr>
<tr>
<td>Recreation Director (YMCA)</td>
</tr>
<tr>
<td>Secretary</td>
</tr>
<tr>
<td>Hospital Worker</td>
</tr>
</tbody>
</table>
decision to go to college. Seventy-five percent of the students reported that 50-100% of their ten closest friends went to college (question 15).

Table 7

<table>
<thead>
<tr>
<th>Persons Who Encouraged Students to Attend College</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Leaders</td>
<td>72</td>
</tr>
<tr>
<td>Family</td>
<td>75</td>
</tr>
<tr>
<td>Family Friends</td>
<td>81</td>
</tr>
<tr>
<td>High School Teachers/Counselors</td>
<td>78</td>
</tr>
</tbody>
</table>

Students also like teachers to share with them some of their expertise which gives them a sense of belonging or identification thus developing a deeper sense of understanding between the two. Therefore the relationships between students and teachers sometimes help students in deciding on a major. Whether or not the relationship was good or bad appears important. It is assumed that a good relationship might cause a student to seek more information from a teacher he likes. However in negative relationships, students may direct their attentions elsewhere for a major. Question 26 was "What was your major(s) in high school?" Thirty-nine percent of the students responded general education. However, 33% of the students' high school majors correlated with the areas of instruction of their favorite teachers (questions 26 and 34). Two interpretations can be suggested. One is that students who like the teachers' personality are more likely to choose a major in that teachers'
field. The other is that students may select a major due to the teacher's adequacy of instruction. The latter seems to coincide with the data, for students did suggest that the grades they received in the areas of math and science affected their decision on a science or non-science major (question 31).

Table 8

<table>
<thead>
<tr>
<th>Student's High School Majors</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>39</td>
</tr>
<tr>
<td>Business</td>
<td>17</td>
</tr>
<tr>
<td>Drafting/Industrial Art</td>
<td>11</td>
</tr>
<tr>
<td>Math</td>
<td>5</td>
</tr>
<tr>
<td>Social Science/Social Work</td>
<td>5</td>
</tr>
<tr>
<td>Child Psychology</td>
<td>3</td>
</tr>
<tr>
<td>English</td>
<td>3</td>
</tr>
<tr>
<td>Nursing</td>
<td>3</td>
</tr>
<tr>
<td>Political Science</td>
<td>3</td>
</tr>
<tr>
<td>Pre-med/Pre-Law</td>
<td>3</td>
</tr>
<tr>
<td>Programming classes</td>
<td>3</td>
</tr>
<tr>
<td>Record Keeping</td>
<td>3</td>
</tr>
<tr>
<td>Stenographer</td>
<td>3</td>
</tr>
</tbody>
</table>

Other things that influenced students' decision in attending college were social awareness, interest, success, salary, scholarship, social pressure, the only method in which career goal could be achieved, family pressure, sports, independence and encouragement from family, teachers, relatives, and peers (question 23).

On the topic of exposure and/or low scoring in high school science and mathematic courses, question 24 dealt with the kind of coursework the black students had taken in high school. It was found that 61% (question 24) of the students surveyed had
taken college preparatory coursework, with 70% of their academic averages at the C+ level (question 25). Although 39% of students were in general education, the highest percent of students majoring in one area concentrated in business (17%). Eleven percent of the students' majored in drafting and industrial art, 5 percent in math and another 5 percent in social science.

In indicating the amount of coursework these students had acquired in high school, 19% had general math only; 17% had algebra only; 14% had general math, algebra I and geometry; and 11% had general math, algebra I, geometry, and algebra II. This data shows that these black students had a reasonable amount of math (question 27); however 36% of the students' math average was a "D", 28% had "C" averages, and 19% had math averages of a "B".

The statistics show these students had even less exposure to the science area (question 28) and poorer grades also (question 30). Thirty-one percent of the students answering this questionnaire were exposed to general science and biology, 17% were exposed to biology alone and 14% was exposed to general science only.

Questions 29, 30, 31, 32, 33, and 35 refer to the adequacy of instruction received by the black students in the areas of math and science. In questions 29 and 30, it was noted that black students' received about average grades in math (question 33) and science (question 32). On the other hand, these students rated their overall math and science instruction in high school
between good and average (question 32 and 33). This might indicate that there was inadequate instruction for these black students or that the students were not interested in the teacher or in the course content. Whatever, 64 percent of the students felt the grades they received in high school math and science courses affected their decision not to choose science as a major (question 31). Another question that might infer inadequate preparation of black students is to question 35. In this item a relatively high percent of students (64%) responded that if given a second chance in high school, they would take more math and/or science courses.

From the results of this study, it can be concluded that black students do believe in obtaining a higher education in which they are encouraged to do so by parents, family friends, relatives, teachers and counselors; but are not or do not seem to be encouraged to go into a career of science. It is a known fact that if you are good at something then encouragement should be given; however what if the potential exists, then that potential should be developed and encouragement should still be given. Therefore, black students need teachers who are enthusiastic about math and science and who can pass some of this enthusiasm on to their students, so that their grades will improve and so that they can be encouraged to pursue these areas.

The data obtained does not seem to corroborate the previous assumption pertaining to the lack of encouragement. The experience of most of the black students is that they received encouragement
to go to college generally (See Table 7). It does not appear that anyone encouraged them to go into the sciences.

A method that could be later utilized with respect to encouragement of black students in the sciences could be initiated by obtaining responses from high school ninth and tenth graders, for it seems that after high school many students who will attend college already have an idea about their prospective major selection.

Three conclusions can be made from the above study. The first is that these EOP students received a wide range of encouragement to attend college. The second is that a relatively high percentage of students (63%) stated the need for more exposure to the biological and physical sciences. The third is that these same students in the sample population did not have high grades in their high school science and math courses.

It appears from the study that two recommendations can be made. One is that more educational guidance could be given to students when they are in high school; the second is that efforts should be increased towards improving the instruction students receive in the areas of math and science.

Once the black students' ideas have been changed about the science area, many of them will likely receive better grades and more encouragement that will stimulate their growth and development of scientific minds.
Bibliography


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Rowe, Mary Budd. "Why Don't Blacks Pick Science?" The Science Teacher, 44(February 1977), 34-35.


Stephenson, Richard M. "Mobility Orientation and Stratification of 1,000 Ninth Graders," American Sociological Review, 22(April 1957), 204-212.


March 14, 1980

TO:  EOP Students
FROM: Denise D. Duncan

Dear Student:

This letter is being sent to you in the hopes that data can be obtained to help me complete my research paper.

I am requesting that each of you meet with me on Tuesday, March 18, 1980 at 6:00 p.m. in the Culture House. At that time, I will be administering a questionnaire pertaining to students' majors. The questionnaire will only take 30 minutes of your valuable time.

I will appreciate your cooperation in attending this meeting. The information that you will be providing will be in the strictest of confidence.

Thanking you in advance,

Denise D. Duncan
APPENDIX B
Questionnaire

1. Age ________

2. Male (53%) or Female (47%) (Circle)

3. What is your college major or what will you select as your major? (Circle)
   a. Business/Business Education, Office Administration (22%)
   b. Social Science: Economics, Geography, History, Home Economics, Political Science, Psychology, Social Work (31%)
   c. Education: Educational Psychology, Library Science, Physical Education, Teaching, Administration (14%)
   d. Humanities: English, Modern Languages, Music, Philosophy/Religion, Speech, Speech Pathology (17%)
   e. Natural Sciences: Biology, Chemistry, Earth Science, Industrial Technology, Mathematics, Physics (17%)

4. Was your decision upon a major a conscientious choice (plenty of thought and consideration taken)? (Circle)
   a. Yes (92%)
   b. No (8%)

5. If yes, what factors aided you in making that decision? (Circle)
   a. Previous experience (related coursework) (36%) ab. (5%)
   b. Future expectations (salary, job satisfaction, etc.) (36%) abc (3%)
   c. Suggestion (from family, peers, friends, etc.) (11%) bc (5%)
   d. Other: personal interest in major, suggestions from veterans administration.

6. Did either of your parents go to college? (Circle)
   a. Both (14%)
   b. Father only (8%)
   c. Mother only (22%)
   d. Neither (53%)

7. What is your father's occupation? ______________________

8. What is your mother's occupation? ______________________

9. Do you have an older brother or sister? (Circle)
   a. Yes (75%)
   b. No (25%)

10. Did your older brother or sister go to college before you? (Circle)
    a. Yes (50%)
    b. No (31%)
    c. No, I have no older brother or sister (19%)
11. What are their occupations if they went to college?
   Sister's occupation ____________________________
   Brother's occupation ____________________________

12. Have you always wanted to go to college? (Circle)
   a. Yes (75%)
   b. No (25%)

13. Did your family expect you to go to college? (Circle)
   a. Yes (75%)
   b. No (25%)

14. Did your high school teachers or counselors expect you to
go to college? (Circle)
   a. Yes (78%)
   b. No (22%)

15. Among your ten closest friends, how many of them went to college?
   (Circle)
   a. 10-100% (14%)  d. 7-70% (4%)  g. 4-40% (3%)
   b. 9-90% (11%)  e. 6-60% (8%)  h. 3-30% (11%)
   c. 8-80% (14%)  f. 5-50% (14%)  i. 2-20% (8%)
   j. 1-10% (3%)

16. Did community leaders expect you to go to college? (Circle)
   a. Yes (72%)
   b. No (28%)

17. Did family friends expect you to go to college? (Circle)
   a. Yes (81%)
   b. No (19%)

18. Did UNI provide a special program such as EOP that interested
   you? (Circle)
   a. Yes (44%)
   b. No (55%)
   c. Other: Talent search, vocational rehab; sports, scholarship; UNI was closest to home and parents wanted them to go.

19. Did UNI give you a scholarship or make financial arrangements
   for you? (Circle)
   a. Yes (89%)
   b. No (11%)

20. What percent of your college expenses are paid by your parents?
   (Circle)
   a. More than 50% (8%)
   b. Half-50% (8%)
   c. Less than 50% (81%)
   d. None (3%)
21. What percent of the scholarship or financial aid covers your education? (Circle)
   a. More than 50%  (61%)
   b. Half-50%  (22%)
   c. Less than 50%  (14%)
   d. None  (3%)

22. In the absence of the scholarship or financial aid, would you have gone to college? (Circle)
   a. Yes  (50%)
   b. No  (5%)

23. If there are other things that influenced your decision in attending college please list:
   a. ________________________________
   b. ________________________________
   c. ________________________________
   d. ________________________________

24. What kind of course work did you take in high school? (Circle)
   a. College prep  (61%)
   b. Vocational  (39%)

25. What was your academic average in high school? (Circle)
   a. 1.0-1.4  (0%)
   b. 1.5-1.9  (3%)
   c. 2.0-2.4  (31%)
   d. 2.5-2.9  (39%)
   e. 3.0-3.4  (17%)
   f. 3.5-4.0  (11%)

26. What was your major(s) in high school? (List)
   a. ________________________________
   b. ________________________________

27. What math courses did you take in high school? (Circle)
   a. General Math  (19%) abc  (14%) abf  (3%)
   b. Algebra I  (17%) abcd  (11%) bcd  (3%)
   c. Geometry  (0%) abcde  (3%) bcde  (3%)
   d. Algebra II  (0%) abcd ef  (3%) bcdef  (3%)
   e. Trigonometry  (0%) abd  (3%) ab  (19%)
   f. Calculus  (0%)
   g. None  (0%)

28. What science course did you take in high school? (Circle)
   a. General Science (Physical Science) ab  (31%)
   b. Biology  (17%) abc  (11%)
   c. General Chemistry  (0%) abcd  (8%)
   d. Physics  (0%) bc  (11%)
   e. None  (3%)

29. What type of grades did you receive in your high school math course? (Circle)
   a. 1.0-1.4  (3%)
   b. 1.5-1.9  (8%)
   c. 2.0-2.4  (36%)
   d. 2.5-2.9  (28%)
   e. 3.0-3.4  (19%)
   f. 3.5-4.0  (5%)
30. What type of grades did you receive in your high school science courses? (Circle)
   a. 1.0-1.4 (3%)
   b. 1.5-1.9 (5%)
   c. 2.0-2.4 (39%)
   d. 2.5-2.9 (31%)
   e. 3.0-3.4 (17%)
   f. 3.5-4.0 (3%)

31. Did the grades you received in your high school math and science courses affect your decision to choose a non-science major?
   a. Yes (64%)
   b. No (36%)

32. How would you rate your overall science instruction in high school? (Circle)
   a. Poor (5%)
   b. Average (33%)
   c. Good (53%)
   d. Excellent (5%)
   e. Took no science (3%)

33. How would you rate your overall math instruction in high school? (Circle)
   a. Poor (0%)
   b. Average (39%)
   c. Good (36%)
   d. Excellent (22%)
   e. Took no math (0%)

34. What course(s) did your favorite high school instructor teach?
   a. __________________________
   b. __________________________
   c. __________________________

35. If you had it to do over again, would you take more math and science courses? (Circle)
   a. Take more math (33%)
   b. Take more science (3%)
   c. Neither (36%)
   d. Both (28%)