1977

Causes of Low Enrollment of Black Students in Upper-Level Science Courses

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CAUSES OF LOW ENROLLMENT OF BLACK STUDENTS
IN
UPPER-LEVEL SCIENCE COURSES

ESE 675, Professional Lab Experience, Dr. Eleanor Scheirer
Professor

And

ESE 690, Independent Study, Dr. Dr. Paul Eggen, Professor

By

Henry L. Jenkins

UNIVERSITY OF NORTH FLORIDA
August 22, 1977
CAUSES OF LOW ENROLLMENT OF BLACK STUDENTS IN UPPER-LEVEL SCIENCE COURSES

Introduction

For approximately seven years, the number of Black students enrolled in upper-level science courses (e.g., Chemistry, Human Physiology, Physics) is proportionately lower than the number of non-Black students at Palatka South High School, Palatka, Florida.

On the surface, this low enrollment appears to coincide with the fact that there are more non-Black students than Black students enrolled in the school. However, if one were to examine closely the total number of Black students enrolled in upper-level science courses from the school's total Black student population enrolled in science classes, and compare it to the school's total non-Black population enrolled in science courses, it would be evident that there exists a significant amount of disproportion between Black and non-Black enrollment in upper-level science courses. If this trend also exists at the County, State, and even the National level, it would be a major factor in the nation's shortage of minority scientific manpower.

The area of science is forever expanding, providing excellent career opportunities, job advancement and security with good salaries. Given the opportunity for leadership and worthwhile contributions as a professional in the scientific community, Dr. Robert Flakes of Florida A & M University has concluded that...
Blacks are under-represented in the science and science-related industries of this country."

Purpose

There were two purposes for this particular project. First, information is needed regarding why many of the eligible Black students are not enrolling in upper-level science courses. Secondly, we need to explore what effective means can be used to increase Black student participation in upper-level science courses.

One approach to this problem was to construct an "Attitudinal Questionnaire" and administer it to all ninth and tenth grade science students in Palatka South High School. These students were selected because they had two to three years left in school and could, therefore, still choose to enroll in additional science courses beyond those required for graduation.

The questionnaire was two-fold also. The first part dealt with the students' attitudes toward science. The second part dealt with alternatives and/or adjustments to the present science courses suggested by student responses as necessary if they were to take upper-level science courses. That is, students indicated the degree of their intentions of taking further work in science provided certain changes were made in the upper-level science programs.

Student attitudes were surveyed so that student intentions to take certain courses could be studied in conjunction with their reasons for holding these attitudes. Later, it was also possible to compare intentions with actual enrollment.
Specifically, this project attempted to identify and explore the reasons why enrollment for Black students in upper-level science courses is low with respect to the following attitudinal dimensions (variables):

A. Interest, or lack of interest in science courses.
B. Difficulty, or lack of difficulty in science courses.
C. Worthwhileness of science courses in terms of their perceived benefit.
D. The student's view of his aptitude in science, and
E. The student's intentions with regard to taking further science courses beyond the required number.

Selection of Variables

The variables selected in this study were chosen due to their frequent occurrence in discussions with students, colleagues, and in discussions in the literature. Of the variables listed, "interest in science" was the one most frequently mentioned. For example, Emiel Hamberlin, a Black biology teacher and Chicago's Teacher of the Year for 1976-77, believes that teachers must first turn the student on to science by "out-doing the student's environment." Hamberlin's classroom looks like a natural outdoor scene with a large variety of both plants and animals.²

Duckworth and Entwistle in their study of attitudes to school subjects isolated the variables of interest, difficulty, freedom, and social benefit. They selected these specific attitudes because they were the major categories given by 120
pupils in a pre-tested sample from the population to be tested, which consisted of 600 college prep students. Their findings indicated that physics was both dull and difficult. A subsequent study showed that even pupils who went on to specialize in physics and chemistry and were keenly interested in these subjects reported them as being among the most difficult. This suggests that perhaps the demands of these courses are too unrealistic and serves as a reason for the declining trend in science enrollments.³

In a study on attitudes toward science of Black students, Tilford noted that components of Black students' attitudes toward science are similar to those of White student responses in previous science attitudinal studies. He further noted that there seem to be attitudes toward science that are unique to a number of Black students, especially those attitudes dealing with the role of Black people in science. The students responded to three statements pertaining specifically to science and Black people. The first statement was "Only exceptional Blacks go into science," in which 14% of the students agreed with the premise. The second statement was "Black persons trained in science would have a favorable influence on the Black community," in which 12% were undecided or disagreed; and the third statement pertained to the background of Black people for success in science in which 24% of the students agreed that it was unsuitable.⁴ There seems to be an implication that the science background of Black students is not adequate, and only the exceptional Black students will be successful in science, but even these students will not be able to make an impact on the Black community.
Haun administered a 13-item attitude scale, which he developed, to 714 students: 254 high school, 340 non-science majors among college freshmen and sophomores, and 112 science majors. His findings are summarized as follows:

1. Attitudes toward science - Nearly 90 percent agreed that science is interesting and that science has value even for non-technical vocations. About 80 percent agreed that all students should take a biological and a physical science.

2. Attitudes toward teachers and high school - Overall, 74% deny that their teachers are poor teachers. Ninety-five percent deny that students are advised not to take science.

3. Attitudes toward others and themselves - Ninety percent deny that "most students razz others who express an interest in science." Over two-thirds agreed that "students want easy courses," and nearly as many said "Science courses require too much time and work."

4. Attitudes toward science courses - Seventy-five percent of the students say science courses are hard, but this percentage varies with the amount of science taken.5

In summary, a Likert type questionnaire was utilized to ascertain information on low enrollment of Black students in upper-level science courses. Several authors who have addressed themselves to the science enrollment problem have isolated the variables of interest, difficulty, worthwhileness, and aptitude as a means of gaining insight into the matter.
In order to get additional insight into increasing enrollment in general chemistry at Palatka South High School, and improving the course, students taking the course were involved in offering feedback. Thirty-seven chemistry students were asked at the end of the course to comment on their likes and dislikes about the course and how it might be improved. The following is a summary of the most common responses given by the students:

A. Favorable Responses

1. They enjoyed working independently.
2. The labs were "Okay."
3. The course strengthens mathematical abilities.
4. Knowledge of the world and its composition was increased.
5. Overall, the course was good.
6. The experiments can be performed at the students' desks.
7. The lecture phase of the course was enjoyable; more was learned using this method.
8. The course was "different."
9. They felt free to ask the instructor for help.
10. They enjoyed the teacher.
11. They preferred tests from lectures (notes) rather than open-book tests.
12. The class was "fun!"
13. They liked the way the class was organized; it allowed individuals to progress at their own rate.
14. The tests were fair.
15. A second year of chemistry for advanced students would be good.

16. Students learn through experiences.

17. The two-hour block of time for class is good.

18. Necessary lab equipment was available.

B. Negative Responses

1. Some of the labs were boring (those that extended over a couple of days or more where nothing "exciting" happened).

2. Many of the questions and problems were difficult.

3. More time should be designated for labs.

4. The guide sheet tests didn't always relate to the materials covered.

5. The guide sheets were difficult.

6. When giving notes, the teacher should slow down.

7. The teacher should offer a lab or two during the last part of the course to make it more interesting.

8. The teacher should "relate" more with students; become involved in their projects.

9. The relationship between the guide sheet problems and labs was vague.

These responses may very well serve as a stepping stone to not only increasing enrollment, but also improving the course at the same time. The students are the ones who are being subjected to the courses; they have first-hand knowledge of its effect on them. Therefore, their responses should not be taken lightly.
Hypotheses:

Based on the attitudinal variables selected for this study, the following declarative form hypotheses (a research hypothesis which states an expected relationship or difference between two variables) were tested:

Hypothesis #1 - The degree of interest in science and science courses is a major factor in both Black and White students' statements of intent to enroll in upper-level science courses.

Hypothesis #2 - The degree of difficulty in upper-level science courses as perceived by the student is a major factor in both Black and White students' statements of intent to enroll in upper-level science courses.

Hypothesis #3 - The degree to which a student perceives a science course as being worthwhile and beneficial is a major factor in both Black and White students' statements of intent to enroll in upper-level science courses.

Hypothesis #4 - The degree of a student's readiness to learn science (aptitude) as perceived by the student is a major factor in both Black and White students' statements of intent to enroll in upper-level science courses.

Hypothesis #5 - The degree to which a student responds positively to proposed changes in present science programs is a major factor in both Black and White students' statements of intent to enroll in upper-level science courses.
Review of Related Literature

Further support of the claim of low enrollment of Blacks in upper-level science courses is indicated by a study made in 1969 by Drs. Martin Spergel and Frank R. Pomilla. In sampling a large academic high school in New York City with fifteen sections of physics they found a total of fifteen Black students out of the 375 students enrolled in physics representing a mere 4% of the physics enrollment. This figure is rather appalling when one considers the fact that there were over 1000 students enrolled in the school at the time of the survey.

In an effort to improve this situation a physics program for disadvantaged students was developed in the spring of 1969 and was called "Project Beacon." The program was designed to stimulate interest in science and engineering and improve the physics curriculum for these students. High schools, universities, and selected industries were utilized.

The function of the high school was to provide a demonstration class of educationally disadvantaged students and a pool of interested teacher participants. The role of the universities was:

1. To deepen, enrich, and update the teachers' knowledge of physics.
2. To introduce the teachers to new science-teaching materials.
3. To assist them in the selection of the new materials and in testing them on the demonstration class of students.
4. To produce "Beacon" teachers who will make changes in their schools' science programs; and
5. To produce "Beacon" students who will feed back into their schools the training and perspectives they gained in the project.

Industry's function was to provide summer employment for the students in meaningful preprofessional learning situations with on-the-job counseling, direction, and supervision.

Students selected for the program were those identified by their high school guidance counselors as economically and culturally deprived youngsters who were reading at grade level and who had shown potential for academic work, but who would not have taken the regular high school physics course.

Teacher selection was based on results of discussions with their departmental chairmen.

During the summer of 1969, seven teachers and thirty students worked in a six-week "Beacon" program. The results are summarized below:

1. The students were highly motivated. The use of the inquiry teaching method with emphasis on laboratory work and access to desk calculators (providing the students with a sense of accomplishment in the form of a tool they had mastered) contributed to this state of motivation.
2. Attendance was good.
3. The students were attentive.
4. They enthusiastically participated in laboratory activities—often electing to forego their mid-morning break to continue their observations.

5. They worked independently, asked pertinent questions and, at times, gave astute answers.

6. They showed a statistically significant increase in cognition on the PSNS, An Approach to Physical Science Double Multiple Choice Test.

7. During the academic year phase of the project, which began in September of 1969, there were two pilot schools selected. Each school offered sections of Project Beacon with fifteen students enrolled in each section. No students failed or dropped out. In the summer of 1970, nineteen of the students were placed in meaningful, career-oriented summer jobs with IBM, Western Electric, and local hospitals and universities with good results.

8. A comparison of pre- and post-test responses to a science inventory questionnaire showed a striking rise in expressed interest in engineering among the students. 

Lester Siegel and Robert Weinstein of Jamaica and Richmond Hill High Schools, respectively, were the teachers and schools involved in the pilot program. The teachers reported that the program had shown progress and that the advantages of the program far outweighed the problems encountered. The advantages were:

1. It provided a rich and worthwhile summer experience for disadvantaged students.
2. It has raised the self-image and self-esteem of the disadvantaged students.

3. It instilled a feeling of self-respect and accomplishment within these students that may never have been realized.

4. The students became aware of the fact that the establishment does "give a damn."

5. It cemented excellent relationships between the disadvantaged community and the school.

Buel C. Robinson, a physics teacher at Washington High School in Denver, Colorado, employs what he terms "A Multi-Gimmick" approach to physics. He feels that by stimulating the interest of the students and making them aware of physics and its many practical applications, enrollment can be increased. He further dispells the notion that physics is only for the elite. He stresses working toward giving the student the four things in a course that they now demand: relevance, interest, excitement, and challenge.

His "Multi-Gimmick" approach consisted of "getting them in," "keeping them in," and "teaching them right." To get students in physics, the following methods were used:

1. Open classrooms to all interested students and faculty members and publicized the fact that classes are open, and

2. Advertise at every opportunity. For example, an annual "fun- and gadget-filled lecture" was given
to sophomores in counseling classes to explain what physics is all about; talks were given to geometry classes to show the relevance of mathematics to science; informal discussions with guidance counselors were held to explain the course, new ideas, and grading system; "Pep" tags and bumper stickers were given out; articles and pictures were featured in the school's newspaper and yearbook; and there was TV coverage of some of the physics projects.

To keep them in physics they used a humanistic approach, treating the students with courtesy and respect. The class sessions were informal, open, and friendly. The students were free to come in for help at any time (with coffee, tea, and cookies) on physics, personal problems, or just to have a "rap" session. Regardless of test scores a student would not fail provided they were willing to work. An elaborate program of extra credit labs, projects, and activities was provided for those students who needed to raise their grades.

"Teaching them right" involved constantly selecting and revising material each year. Teachers found that much of the joy of teaching came from the give and take found in the classroom and that a rigid lecture given year after year without change leads to boredom for both the teacher and students.

The results of the program were an increase in interest in physics on the part of the students and at times two-thirds of the students got grades of "A" for the course.
Walter E. Elliot in a study entitled "Perceptions of High School Physics and Physics Teachers" noted the following implication for schools: Physics courses need wide appeal to girls, lower-ability students, terminal students, and students who tend to be people-oriented. To accomplish this he recommends the following:

1. Large high schools should offer a variety of physics courses appealing to a broader spectrum of student interests, abilities, and needs.

2. Smaller schools offering only a single course in physics should design it to meet a broader spectrum of student interests, abilities, and needs.

3. Special emphasis should be put upon inclusion of course objectives with stronger appeal to girls, to students of average and low-average academic abilities, to students not planning academic work after graduation, and to students who tend to be people-oriented. This emphasis implies greater inclusion of social, historical, and political aspects of physics in course objectives.

4. Regular feedback of student perceptions should be used as one basis for continuous modification of physics curricula to better meet the changing needs, interests, and abilities of students.

5. Schools should reconsider course prerequisites in light of the preceding recommendations.
6. Schools should consider integrated science courses as another means of introducing more students to the concepts of physics.\(^9\)

In an article done between 1969-70 and 1972-73 on scientific achievement, according to racial and regional trends for Black and White students ages 9, 13, and 17, it was indicated that the major achievement findings were:

1. In the nation as a whole, science achievement declined between 1969-70 and 1972-73. Declines between approximately one and three percent points were observed for both Blacks and Whites at all three ages.

2. Declines in science achievement were smaller in the Southeast than in the other regions. Although White students generally showed declines in science achievement nationwide, the declines for White students in the Southeast were generally not as great as elsewhere.

3. The achievement of 9-year-old Blacks in the Southeast improved, and the achievement of 13- and 17-year-old Blacks did not decline as much as the performances of Blacks in the rest of the nation.

4. For Black students of all three ages in the rest of the nation—Northeast, Central, and Western regions—declines in science achievement were generally larger than those of White students or those of Southeastern Blacks. The one exception was at age 17.\(^{10}\)
Development And Use of Questionnaire

As noted earlier, the variables of interest, difficulty, worthwhileness, aptitude, and intent to take upper-level science courses have been isolated in this study.

A 53-Likert-item instrument was developed as a result of discussions with students, colleagues, and in discussions in the literature. The instrument was then critiqued by professors in the education department at the University of North Florida. The comments and suggestions of the professors were under consideration. A two-part 35-item instrument was the final result. The first part, consisting of 21 items, dealt with student attitudes toward science and the second part, consisting of 14 items, was concerned with the students' intent to enroll in upper-level science courses.

Each science teacher in the department willingly agreed to participate in the survey by administering the questionnaires to their students in the prescribed manner. Even though the ninth and tenth grade students were singled out as the target area of this study, all students enrolled in science courses were surveyed. In order to obtain data on the race of the students, the questionnaires were coded before distribution.

The questionnaires were administered over a three-day period, although over two-thirds were given the first day. The teachers reported that on the average, students completed the questionnaires within 10 to 15 minutes, and were quite cooperative.
After each science teacher returned his or her questionnaires (including extra ones and those improperly filled out), they were counted. A total of 660 questionnaires were given out and the same number returned. Of this number 553 were usable, 94 were extra copies, and 13 were defective (i.e. they did not indicate race, grade, or sex). There were 749 students enrolled in science classes at the time of the survey and 76% of these students, therefore, participated in the study. The questionnaires were then arranged into 16 categories. The categories were:

1. Ninth grade Black males
2. Ninth grade Black females
3. Ninth grade White males
4. Ninth grade White females
5. Tenth grade Black males
6. Tenth grade Black females
7. Tenth grade White males
8. Tenth grade White females
9. Eleventh grade Black males
10. Eleventh grade Black females
11. Eleventh grade White males
12. Eleventh grade White females
13. Twelfth grade Black males
14. Twelfth grade Black females
15. Twelfth grade White males
16. Twelfth grade White females
Upon completion of categorizing the questionnaires the responses for each item on the questionnaire were recorded. After all the questionnaires in a group were recorded, a total percentage response for each item for the group (1-16) was obtained.

To facilitate the tallying of the questionnaires two reliable high school students were assigned to help count the responses. This method proved to be very time-consuming, as well as tedious, and more important, probably not as reliable due to the number of questionnaires and questions on the survey. In an effort to cross check the present data and keep it as reliable as possible, the services of the University of North Florida computer center were utilized. By the use of a coding system, the information from each questionnaire was transferred to a computer key-punch card, fed into the computer which, in return, produced a 134-page report of the data by grade level, race, sex, and a percentage breakdown. In addition to this, information on raw CHI square (used to test differences between frequencies of variables),\textsuperscript{11} degrees of freedom (the number of values of an observation which are free to vary),\textsuperscript{12} significance (refers to the probability of error),\textsuperscript{13} and the number of missing observations was given. A second print-out was made and contained information on correlations using Pearson's Product-Moment correlation coefficient (it assesses the degree of relationship between two variables).\textsuperscript{14}
Data

As of February 25, 1977, there were a total of 1,129 students enrolled in Palatka South High School according to the attendance department records. Of this number, 218 were Black students, 911 were White students, and 786 students of the total enrollment were taking science courses (both Black and White students). A breakdown of the latter number showed that there were 155 Black students and 631 White students enrolled in science courses. A further breakdown showed that there were only 12 Black students enrolled in upper-level science courses (Botany, Zoology, Chemistry, Physics, and Human Physiology), and 141 White students enrolled in these courses.

TABLE I: SCIENCE ENROLLMENT at PALATKA SOUTH HIGH SCHOOL

<table>
<thead>
<tr>
<th>Science Courses</th>
<th>Total Number of Students</th>
<th>Total Black</th>
<th>Total White</th>
<th>% Black</th>
<th>% White</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Science</td>
<td>290</td>
<td>66</td>
<td>224</td>
<td>22.7</td>
<td>77.2</td>
</tr>
<tr>
<td>General Biology</td>
<td>157</td>
<td>47</td>
<td>110</td>
<td>29.9</td>
<td>70.0</td>
</tr>
<tr>
<td>Advance Biology</td>
<td>74</td>
<td>3</td>
<td>71</td>
<td>4.0</td>
<td>95.9</td>
</tr>
<tr>
<td>Health &amp; Hygiene</td>
<td>52</td>
<td>11</td>
<td>41</td>
<td>21.1</td>
<td>78.8</td>
</tr>
<tr>
<td>Ecology</td>
<td>72</td>
<td>16</td>
<td>56</td>
<td>22.2</td>
<td>77.7</td>
</tr>
<tr>
<td>Botany</td>
<td>29</td>
<td>3</td>
<td>26</td>
<td>10.3</td>
<td>89.6</td>
</tr>
<tr>
<td>Zoology</td>
<td>29</td>
<td>1</td>
<td>28</td>
<td>3.4</td>
<td>96.5</td>
</tr>
<tr>
<td>Chemistry</td>
<td>56</td>
<td>5</td>
<td>51</td>
<td>8.9</td>
<td>91.0</td>
</tr>
<tr>
<td>Physics</td>
<td>12</td>
<td>1</td>
<td>11</td>
<td>8.3</td>
<td>91.6</td>
</tr>
<tr>
<td>Human Physiology</td>
<td>15</td>
<td>2</td>
<td>13</td>
<td>13.3</td>
<td>86.6</td>
</tr>
<tr>
<td>Totals</td>
<td>786</td>
<td>155</td>
<td>631</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Three types of analyses were done. The first type was the correlation of letter grades (item number 3) with items 6, 8, 9, 11, 12, 14, and 21 in Part I and items 2, 3, 5, 9, and 12 (See Appendix for items listed) in Part II of the science survey questionnaire as shown in Tables 2 through 9. The information was divided by sex, grade level, and race for ninth and tenth grade students.

The second type of analysis involved the correlation of all items in the questionnaire with all other items with only those yielding significant levels of .05 or less being recorded. The information was divided by sex, grade level, and race for the ninth and tenth grade students, as shown in Tables 10 through 13D.

The third type of analysis was a comparison of the responses made by Black and White students to the variables listed in the study, as shown in Table 14.
TABLE II: PEARSON CORRELATION COEFFICIENT

Black 9th Grade Males
Science Survey Questionnaire

Part I

<table>
<thead>
<tr>
<th>Item #</th>
<th>Correlation Coefficient</th>
<th>Significance</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>-0.2823</td>
<td>.154</td>
<td>15</td>
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<tr>
<td>8</td>
<td>-0.2795</td>
<td>.147</td>
<td>16</td>
</tr>
<tr>
<td>9</td>
<td>0.4684</td>
<td>.034*</td>
<td>16</td>
</tr>
<tr>
<td>11</td>
<td>-0.3480</td>
<td>.093</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>-0.1098</td>
<td>.343</td>
<td>16</td>
</tr>
<tr>
<td>14</td>
<td>0.2488</td>
<td>.196</td>
<td>14</td>
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<tr>
<td>21</td>
<td>-0.1367</td>
<td>.321</td>
<td>14</td>
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</table>

*Indicates an acceptable level of significance

Item #3, Part I with:

Part II

<table>
<thead>
<tr>
<th>Item #</th>
<th>Correlation Coefficient</th>
<th>Significance</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.2545</td>
<td>.190</td>
<td>14</td>
</tr>
<tr>
<td>3</td>
<td>0.2801</td>
<td>.166</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>0.4237</td>
<td>.058</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
<td>0.1955</td>
<td>.234</td>
<td>16</td>
</tr>
<tr>
<td>12</td>
<td>0.3317</td>
<td>.105</td>
<td>16</td>
</tr>
</tbody>
</table>
**TABLE III. PEARSON CORRELATION COEFFICIENT**

Black 9th Grade Females
Science Survey Questionnaire

**Part I**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Correlation Coefficient</th>
<th>Significance</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>-.4390</td>
<td>.051*</td>
<td>15</td>
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<tr>
<td>8</td>
<td>-.1705</td>
<td>.289</td>
<td>13</td>
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<td>9</td>
<td>.5052</td>
<td>.027*</td>
<td>15</td>
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<td>11</td>
<td>-.3795</td>
<td>.081</td>
<td>15</td>
</tr>
<tr>
<td>12</td>
<td>-.4423</td>
<td>.049*</td>
<td>15</td>
</tr>
<tr>
<td>14</td>
<td>.0864</td>
<td>.385</td>
<td>14</td>
</tr>
<tr>
<td>21</td>
<td>-.4461</td>
<td>.055*</td>
<td>14</td>
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</table>

*Indicates acceptable levels of significance.

**Item #3, Part I with:**

**Part II**

<table>
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<th>Item #</th>
<th>Correlation Coefficient</th>
<th>Significance</th>
<th># of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>.5447</td>
<td>.022*</td>
<td>14</td>
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<tr>
<td>3</td>
<td>.1933</td>
<td>.254</td>
<td>14</td>
</tr>
<tr>
<td>5</td>
<td>.1753</td>
<td>.266</td>
<td>15</td>
</tr>
<tr>
<td>9</td>
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<td>.367</td>
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</tr>
<tr>
<td>12</td>
<td>.5130</td>
<td>.030*</td>
<td>14</td>
</tr>
</tbody>
</table>
**TABLE IV: PEARSON CORRELATION COEFFICIENT**

Black 10th Grade Females

Science Survey Questionnaire

**Part I**

Item #3 with:

<table>
<thead>
<tr>
<th>Item #</th>
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*Indicates an acceptable level of significance.*
### TABLE V. CORRELATION COEFFICIENT (PEARSON)

**Black 10th Grade Males**

**Science Survey Questionnaire**

**Part I**

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*Indicates an acceptable level of significance.*
### TABLE VI: PEARSON CORRELATION COEFFICIENT

**White 9th Grade Females**

**Science Survey Questionnaire**

#### Part I

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*Indicates an acceptable level of significance.*
TABLE VII: PEARSON CORRELATION COEFFICIENT

White 9th Grade Males
Science Survey Questionnaire

Part I

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*Indicates an acceptable level of significance.


**TABLE VIII. PEARSON CORRELATION COEFFICIENT**

White 10th Grade Males

Science Survey Questionnaire

**Part I**

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*Indicates an acceptable level of significance.
TABLE IX: PEARSON CORRELATION COEFFICIENT

White 10th Grade Females

Science Survey Questionnaire

Part I

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Part II

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*Indicates an acceptable level of significance.
Tables 10-13D represent a correlation of all items in the questionnaire with all other items, but only the significant correlations were listed.

**TABLE X: SIGNIFICANT CORRELATIONS**

Black 9th Grade Males

First Number Equals Correlation Coefficient  
Second Number Equals Significance Level

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#### Part I

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Black 9th Grade Females

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</table>
Table 14 represents a comparison of Black and White students' responses to the variables listed.

**TABLE XIV: COMPARISON OF % OF POSITIVE RESPONSE SCORES OBTAINED BY BLACK AND WHITE STUDENTS IN SCIENCE ON THE VARIABLES INDICATED**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Black</th>
<th>White</th>
<th>$X^2$</th>
<th>Degrees of Freedom</th>
<th>Significance</th>
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</thead>
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<tr>
<td>Interest in Science</td>
<td>27.27</td>
<td>27.25</td>
<td>4.53</td>
<td>4</td>
<td>.370</td>
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<td>Difficulty of Science</td>
<td>31.13</td>
<td>26.35</td>
<td>10.52</td>
<td>4</td>
<td>.035</td>
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<td>Worthwhileness of Science</td>
<td>34.67</td>
<td>31.42</td>
<td>10.58</td>
<td>4</td>
<td>.030</td>
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<td>Aptitude in Science</td>
<td>16.30</td>
<td>22.30</td>
<td>9.75</td>
<td>4</td>
<td>.040</td>
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<tr>
<td>Positive Response to Enrolling in Science</td>
<td>59.85</td>
<td>57.40</td>
<td>3.40</td>
<td>2</td>
<td>.480</td>
</tr>
</tbody>
</table>
Analysis of Data

The number of Black students enrolled in upper-level science courses was proportionately lower than the number of non-Black students as postulated in the introduction section. In fact, only 9% of the total population of Black science students were enrolled in upper-level science classes compared to 22% of the White science students. While both of these percentages were low, it was even more so among the Black students.

The ninth and tenth grade science students were selected as the target group for this study. Thus, the major thrust of this section of the report deals with the responses of this select group.

The analysis of the data was done by sub-groups. There were eight sub-groups determined by sex, grade, and race, with major attention given to the responses of the Black students.

The information collected correlating letter grades with selected items from Parts I and II of the questionnaire indicated the following:

1. The Black ninth grade students who made good grades in the science class they were taking agreed that their parents would approve of their going into science, and those students making poor grades said their parents would not approve (p = .034-males and .027-females).

2. The Black ninth grade females who made poor grades in the science class they were taking indicated that science classes were boring, and those making good grades tended to disagree that the courses were boring (p = .051). Also, those
who made poor grades tended to dislike coming to science classes, while those making good grades liked coming to these classes \((p = .04)\). This dislike of coming to science classes was also true among the Black tenth grade females \((p = .04)\).

3. The Black tenth grade males who made low grades in the science classes they were taking agreed that they could not afford the time and money it would take to prepare for a science occupation, and those who made good grades indicated that they could afford the time and money \((p = .04)\). In addition, those who made poor grades tended to agree that reading science was difficult and those who made good grades disagreed that reading science was difficult, \((p = .005)\).

When all items were correlated with all other items for each of the Black subgroups, the responses that were significant to the .05 level or less were recorded. The analyses of these findings are stated in the following pages by race, grade level, and sex.

**Analysis of Significant Correlations Among Responses of Black Ninth Grade Males**

Pearson's Correlation Coefficient indicated the following:

1. Those students who agreed that science courses were boring indicated that

   a. They could not afford the time and money to prepare for a science occupation.

   b. Science is not challenging enough.

   c. They disliked coming to science class, and

   d. The activities done in class were useless.
2. Those students who agreed that learning science primarily involved memorizing terms and words indicated that
   a. What they were learning in science would be useful outside school.
   b. They thought about science outside of class.
   c. Experiments were hard to understand.
   d. The class activities were useless.
   e. Upper-level science courses would enable a student to do well in college and on non-college related jobs, and
   f. They were learning a lot in science.

3. Those students who indicated that science was not challenging enough also agreed that reading science was difficult and the things done in class were useless.

4. Those students who agreed that they enjoyed doing science experiments indicated that
   a. They enjoyed coming to science class.
   b. They thought about science outside of class.
   c. Upper-level science courses would enable a student to do well in college and on non-college related jobs.

5. Those students who implied that they would enroll in an upper-level science course if the course were individualized also indicated that
   a. Science courses were not boring.
   b. They liked coming to science class, and
   c. They did not read more science material than when they were in eighth grade.

6. Those students who implied that they would enroll in an upper-level science course if they could perform interesting lab experiments also indicated that
a. Their parents would approve of their going into science.
b. They liked coming to science class.
c. They enjoyed doing science experiments.
d. The activities done in class were useful, and
e. Upper-level science courses would enable a student to do well in college and non-college related jobs.

7. Those students who agreed that they would enroll in an upper-level science course if they could get help from the teacher after school hours indicated that
   a. Science courses were not boring.
   b. They did not read any more science material than when in eighth grade.
   c. They enjoyed doing the science experiments.
   d. They thought about science outside class, and
e. Upper-level science courses would enable a student to do well in college and non-college related jobs.

8. Those students who agreed that they would enroll in an upper-level science course if what they were studying was frequently related to careers (jobs) that they may pursue indicated that
   a. Science was not challenging enough.
   b. They liked coming to science class.
   c. They enjoyed doing science experiments.
   d. What they were learning would be useful to them outside school, and
e. Experiments were hard to understand.
Analysis of Significant Correlations of Black Ninth Grade Females

Pearson's Correlation Coefficient indicated the following:

1. Those students who agreed that what they were learning in science would be useful to them outside of school indicated that
   a. Science courses were not boring, and
   b. They could afford the money and time needed to prepare for a science occupation.

2. Those students who agreed that upper-level science courses would enable a student to do well in college and non-college related jobs indicated that
   a. They plan to take another science course.
   b. Science courses were not boring.
   c. Their parents would approve of their going into science, and
   d. Science was challenging to them.

3. Those students who stated that they were learning a lot in science indicated that
   a. They plan to take another science course.
   b. The experiments were not hard to understand
   c. The activities done in class were useless.

4. Those students who wanted to take only required science courses indicated that
   a. They did not plan to take another science course.
   b. Science courses were boring.
   c. Science courses are too challenging.
   d. Reading science is difficult.
e. Taking upper-level science courses would not enable a student to do well in college or on non-college related jobs, and

f. The activities done in science class were useless.

5. Those students who implied that they would enroll in an upper-level science course if they were encouraged to get help from the teacher after school hours indicated that

a. They could afford the time and money needed to prepare for a science occupation.

b. The activities done in class were useful.

c. They wanted to take more than the required number of science courses.

6. Those students who implied that they would enroll in an upper-level science course if they could work in small groups when needed indicated that

a. Science is not challenging enough for them.

b. They liked coming to science class, and

c. They wanted to take more than the required number of science courses.

7. Those students who implied that they would enroll in an upper-level science course if they were encouraged by their teacher to enroll in the course indicated that

a. They plan to take another science course.

b. They can afford the time and money needed to prepare for a science occupation.

c. Science is not challenging enough for them, and

d. They were learning a lot in science.

Analysis of Significant Correlations of Black Tenth Grade Males

Pearson's Correlation Coefficient indicated the following:
1. Those students who disliked coming to science class indicated that
   a. They do not plan to take another science class.
   b. Science courses are boring.
   c. Learning science primarily involved memorizing terms and words.
   d. Science is not challenging enough for them.
   e. Reading science is difficult, and
   f. They do not think about science when not in school.

2. Those students who stated that what they were learning in science would be useful to them outside school indicated that
   a. Science courses were not boring.
   b. Learning science was not primarily memorizing terms and words.
   c. Reading science is not difficult.
   d. They liked coming to science class, and
   e. They read more science material than they did in eighth grade.

3. Those students who stated that they did not want to take more than the required number of science courses indicated that
   a. They could not afford the time and money to prepare for a science occupation.
   b. They liked coming to science class.
   c. What they were learning in science will be useful outside school, and
   d. They learned a lot in science.
4. Those students who implied that they would enroll in an upper-level science course if they could perform interesting lab experiments indicated that
   a. They could afford the money and time needed to prepare for a science occupation.
   b. Reading science was not difficult.
   c. They thought about science outside of class, and
   d. They were learning a lot in science.

5. Those students who agreed that they would enroll in an upper-level science course if they were given class time to work on science projects indicated that
   a. They did not plan to take another science course, and
   b. The experiments were not hard to understand.

6. Those students who agreed that they would enroll in an upper-level science course if what they were studying was frequently related to careers indicated that
   a. Their parents would approve of their going into science, and
   b. They wanted to take more than the required number of science courses.

Analysis of Significant Correlations of Black Tenth Grade Females

Pearson's Correlation Coefficient indicated the following:

1. Those students who plan to take another science course indicated that
   a. They could afford the time and money needed to prepare for a science occupation.
   b. They liked coming to science class.
c. They enjoyed doing science experiments.
d. What they were learning would be useful outside class.
e. They thought about science outside school.
f. The things done in class were useful.
g. They were learning a lot in science, and
h. They wanted to take more than the required number of science classes.

2. Those students who agreed that science courses were boring indicated that
   a. Their parents would not approve of their going into science, and
   b. They did not enjoy the science experiments.

3. The students who thought about things they learned in class when not in school indicated that
   a. They planned to take another science class.
   b. Reading science was not difficult, and
   c. What they were learning in science would be useful to them outside school.

4. Those students who stated that reading science was difficult indicated that
   a. They did not think about things learned in science outside of school, and
   b. The things they did in class were useless.

5. Those students who implied that they would enroll in an upper-level science course if the course was individualized indicated that
   a. Science courses were not boring.
   b. They could afford the time and money needed to prepare for a science occupation.
c. They did not read more science material than when in eighth grade.

d. They enjoyed doing science experiments.

e. They were learning a lot in science, and

f. They wanted to take more than the required number of science courses.

6. Those students who implied that they would enroll in an upper-level science course if visiting speakers presented interesting and exciting demonstrations and lectures to the class indicated that

a. They planned to take another science course.

b. Science courses were not boring.

c. They did not read more science material than when in the eighth grade.

d. They enjoyed doing science experiments.

e. Experiments were not hard to understand, and

f. They wanted to take more than the required number of science courses.

7. Those students who implied that they would enroll in an upper-level science course if they were allowed to take a similar make-up test on any test they made a grade that was below "C" indicated that

a. Science courses were not boring, and

b. They enjoyed doing science experiments.

8. Those students who agreed that they would enroll in an upper-level science course if what they were studying was frequently related to careers that they might pursue indicated that

a. They planned to take another science course.
b. They could afford the time and money needed to prepare for a science occupation.

c. Reading science is not difficult, and

d. They wanted to take more than the required number of science courses.

9. Those students who agreed that they would enroll in an upper-level science course if they were given class time to work on science projects indicated that

a. They planned to take another science course.

b. They thought about things learned in science classes when not in school.

c. They were not learning a lot in science this year, and

d. They would like to take more than the required number of sciences.

To determine whether there were significant relationships between Black and White students' responses on the five variables stated in Hypotheses 1 through 5, Chi-square scores and significant levels were obtained via computer analysis. The level of significance was set at .05.

The first and fifth hypotheses were rejected (p > .05), indicating that the degree of interest in science and science courses, and the degree to which a student responds positively to proposed changes in present science programs were not significant factors in both Black and White students' statements of intent to enroll in upper-level science courses.

The second, third, and fourth hypotheses were accepted (p < .05), indicating that the following were major factors in both Black and White students' statements of intent to enroll
in upper-level science courses:

1. The degree of difficulty in upper-level science courses as perceived by the student.

2. The degree to which a student perceived a science course as being worthwhile and beneficial, and

3. The degree of a student's readiness to learn science (aptitude) as perceived by the student.

Discussions and Conclusions

The problem that initiated this study and was discussed earlier in this paper was the very low enrollment of Black students in upper-level science courses. By examining the ninth and tenth grade students through the use of a science questionnaire, it was hoped that clues might be obtained to help solve the problem.

This study has found that it is primarily the capable students with high science interests who are willing to enroll in upper-level science courses.

Based on the data it is apparent that those Black students who make good grades in science liked coming to class and enjoyed doing the labs are the ones who had positive attitudes and were more interested in science. The data further supports the notion that these same students were likely to take additional courses in science. Just the reverse was true for those Black students who made poor grades in science, did not like coming to science class, nor doing the labs.

The implications of these findings suggest that more attention should be focused on the students who make poor grades
in science, disliked coming to class and doing labs. The variables of interest, difficulty, and worthwhileness, as brought out in Part II of the science survey questionnaire address the matter. In order to help these students, much is needed in the way of making science courses come "alive" with a variety of interesting means of presenting concepts and ideas. At the same time teachers must ensure that the student comprehends what is being taught and, by all means, the teacher should seek ways to make the course relevant and worthwhile to each student in the course.

You may recall that only nine percent of the total population of Black students were enrolled in upper-level science courses at the time of this survey. An average of the "yes" responses to enrolling in upper-level science courses, if certain modifications were made, showed an unbelievable 533% increase over current enrollment, which means that the enrollment would jump from 12 to 74 Black students. Note that this study did not include the actual pre-registration science enrollment in upper-level science for the following responses:

1. No modified science programs encompassing the changes indicated have been instituted for the upcoming school year at Palatka High School.

2. The school has merged with another high school and separate enrollment figures were unavailable.

Yet, while actual registration figures may not be obtained for this particular setting, directions for possible improvement of the upper-level science curriculum designed to effect
a larger Black student enrollment are clearly suggested in this data.

The implications of these findings also suggest that adaptations in upper-level science courses need to be made in order to attract more capable Black students. It further suggests that these adaptations incorporate the variables of relevance, interest, excitement and challenge.

More needs to be done in the areas of developing and testing programs which incorporate the variables mentioned above and to identify those Black students who have the potential to do well in upper-level science courses with the intent to ensure that they enroll in these classes.

The value of this report is manifested by the light it has shown on the problem of low enrollment of Black students in upper-level science courses at Palatka South High School. If the findings of this report can be extrapolated to the county, state, and indeed the national level, it would point out a major factor in the nation's shortage of Black scientific manpower.
APPENDIX

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SCIENCE SURVEY QUESTIONNAIRE

PART ONE:

A. Please use checks and short answers for this portion.

1. What is your present-grade level?
   9th _____ 10th _____ 11th _____ 12th _____

2. What science courses or course are you taking now?
   Biological Science - 12  Physical Science - 83

3. What is your approximate grade average in the science course(s)?
   A 6  B 0  C 24  D 35  F 35

4. Do you plan to take another science course?
   Yes 59  Undecided 29  No 12

5. What math courses have you taken and are presently taking?
   General Math I - 71  Algebra I - 29  Geometry 0
   General Math II 0  Algebra II 0  Other 0

B. Please check the answer that most agrees with how you feel about science at this school.

6. Science courses are boring.
   Strongly agree 24  Agree 6  Undecided 35
   Disagree 24  Strongly disagree 6

7. Learning science primarily involves memorizing terms and words.
   Strongly agree 24  Agree 53  Undecided 12
   Disagree 12  Strongly disagree 0

8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree 18  Agree 6  Undecided 29
   Disagree 29  Strongly disagree 18

9. My parents would approve of my going into science.
   Strongly agree 29  Agree 41  Undecided 12
   Disagree 18  Strongly disagree 0

10. Science is not challenging enough for me.
    Strongly agree 6  Agree 12  Undecided 24
    Disagree 24  Strongly disagree 35

11. Reading science is difficult.
    Strongly agree 24  Agree 12  Undecided 6
    Disagree 47  Strongly disagree 12

12. I dislike coming to science class.
    Strongly agree 18  Agree 18  Undecided 18
    Disagree 29  Strongly disagree 18

13. I read more science materials than I did in 8th grade.
    Strongly agree 41  Agree 24  Undecided 12
    Disagree 12  Strongly disagree 12
14. I enjoy doing the science experiments.
   Strongly agree 53  Agree 29  Undecided 6
   Disagree 0  Strongly disagree 0

15. What I am learning in science will be useful to me outside school.
   Strongly agree 41  Agree 18  Undecided 18
   Disagree 12  Strongly disagree 0

16. I think about things we learn in science class when I'm not in school.
   Strongly agree 18  Agree 35  Undecided 18
   Disagree 6  Strongly disagree 12

17. Experiments are hard to understand.
   Strongly agree 18  Agree 12  Undecided 18
   Disagree 29  Strongly disagree 12

18. The things we do in this class are useless.
   Strongly agree 18  Agree 18  Undecided 6
   Disagree 24  Strongly disagree 24

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.
   Strongly agree 24  Agree 24  Undecided 18
   Disagree 12  Strongly disagree 6

20. I am learning a lot in science this year.
   Strongly agree 24  Agree 47  Undecided 12
   Disagree 6  Strongly disagree 0

21. I do not want to take any more science classes than I have to take.
   Strongly agree 6  Agree 41  Undecided 18
   Disagree 12  Strongly disagree 12

PART TWO:
A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

   Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   Yes 18  Undecided 41  No 29

2. You could perform interesting lab experiments.
   Yes 47  Undecided 29  No 12

3. Visiting speakers presented interesting and exciting demonstrations and lectures to the class.
   Yes 47  Undecided 29  No 12

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, chalkboard, models, transparencies, films, student demonstrations, etc.).
   Yes 53  Undecided 24  No 12
5. Field trips, which are related to what you are studying are taken frequently
   Yes 47  Undecided 12  No 35

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
   Yes 41  Undecided 24  No 35

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.
   Yes 35  Undecided 35  No 29

8. What you are studying is frequently related to careers (jobs) that you may pursue.
   Yes 29  Undecided 41  No 29

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
   Yes 41  Undecided 18  No 41

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
    Yes 35  Undecided 53  No 12

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 53  Undecided 35  No 12

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 35  Undecided 29  No 35

13. You were given class time to work on science projects.
    Yes 71  Undecided 6  No 24

14. You were encouraged by your teacher to enroll in the course.
    Yes 35  No 65
SCIENCE SURVEY QUESTIONNAIRE

PART ONE:
A. Please use checks and short answers for this portion.
1. What is your present grade level?
   9th ____ 10th ____ 11th ____ 12th ____
2. What science courses or course are you taking now?
   Biological Science - 6  Physical Science - 94
3. What is your approximate grade average in the science course(s)?
   A 0  B 12  C 18  D 41  F 24
4. Do you plan to take another science course?
   Yes 29  Undecided 53  No 20
5. What math courses have you taken and are presently taking?
   General Math I 82  Algebra I 0  Geometry 0
   General Math II 0  Algebra II 0  Other 6
B. Please check the answer that most agrees with how you feel about science at this school.
6. Science courses are boring.
   Strongly agree 29  Agree 29  Undecided 18
   Disagree 24  Strongly disagree 0
7. Learning science primarily involves memorizing terms and words.
   Strongly agree 0  Agree 53  Undecided 24
   Disagree 18  Strongly disagree 0
8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree 0  Agree 24  Undecided 41
   Disagree 29  Strongly disagree 0
9. My parents would approve of my going into science.
   Strongly agree 6  Agree 41  Undecided 41
   Disagree 6  Strongly disagree 0
10. Science is not challenging enough for me.
    Strongly agree 6  Agree 18  Undecided 24
     Disagree 59  Strongly disagree 6
11. Reading science is difficult.
    Strongly agree 18  Agree 12  Undecided 18
    Disagree 29  Strongly disagree 12
12. I dislike coming to science class.
    Strongly agree 29  Agree 29  Undecided 18
    Disagree 24  Strongly disagree 0
13. I read more science materials than I did in 8th grade.
    Strongly agree 6  Agree 12  Undecided 6
    Disagree 12  Strongly disagree 0
14. I enjoy doing the science experiments.
   Strongly agree 12  Agree 53  Undecided 34
   Disagree 6  Strongly disagree 0

15. What I am learning in science will be useful to me outside school.
   Strongly agree 0  Agree 59  Undecided 41
   Disagree 0  Strongly disagree 0

16. I think about things we learn in science class when I'm not in school.
   Strongly agree 6  Agree 35  Undecided 18
   Disagree 29  Strongly disagree 0

17. Experiments are hard to understand.
   Strongly agree 0  Agree 6  Undecided 35
   Disagree 42  Strongly disagree 6

18. The things we do in this class are useless.
   Strongly agree 0  Agree 18  Undecided 47
   Disagree 18  Strongly disagree 24

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.
   Strongly agree 18  Agree 24  Undecided 35
   Disagree 12  Strongly disagree 0

20. I am learning a lot in science this year.
   Strongly agree 0  Agree 59  Undecided 29
   Disagree 6  Strongly disagree 0

21. I do not want to take any more science classes than I have to take.
   Strongly agree 12  Agree 47  Undecided 24
   Disagree 12  Strongly disagree 0

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

   Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   Yes 0  Undecided 76  No 18

2. You could perform interesting lab experiments.
   Yes 47  Undecided 29  No 18

3. Visiting speakers presented interesting and exciting demonstrations and lectures to the class.
   Yes 41  Undecided 29  No 24

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
   Yes 65  Undecided 29  No 0
5. Field trips, which are related to what you are studying are taken frequently.

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.

8. What you are studying is frequently related to careers (jobs) that you may pursue.
Yes [65]  Undecided [18]  No [35]

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
Yes [35]  Undecided [29]  No [35]

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
Yes [76]  Undecided [18]  No [0]

11. If time was provided to discuss topics you were interested in pursuing.
Yes [41]  Undecided [53]  No [6]

12. If you were allowed to select some of the topics to be discussed in class.
Yes [41]  Undecided [35]  No [18]

13. You were given class time to work on science projects.

14. You were encouraged by your teacher to enroll in the course.
Yes [53]  No [41]
SCIENCE SURVEY QUESTIONNAIRE

Male ______ % Response by Black 10th Grade Males  Female ______

PART ONE:

A. Please use checks and short answers for this portion.

1. What is your present grade level?
   
   [ ] 9th  [ ] 10th  [ ] 11th  [ ] 12th

2. What science courses or course are you taking now?
   
   Biological Science - 65.3  Physical Science - 26.9

3. What is your approximate grade average in the science course(s)?
   
   [ ] A 15.4  [ ] B 15.4  [ ] C 26.9  [ ] D 26.9  [ ] F 7.7

4. Do you plan to take another science course?
   
   Yes [ ] 23  Undecided [ ] 27  No [ ] 46

5. What math courses have you taken and are presently taking?
   
   General Math I [ ] 41  Algebra I [ ] 23  Geometry [ ] 0
   General Math II [ ] 85  Algebra II [ ] 4  Other [ ] 4

B. Please check the answer that most agree with how you feel about science at this school.

6. Science courses are boring.
   
   Strongly agree [ ] 0  Agree [ ] 8  Undecided [ ] 8
   Disagree [ ] 54  Strongly disagree [ ] 31

7. Learning science primarily involves memorizing terms and words.
   
   Strongly agree [ ] 0  Agree [ ] 31  Undecided [ ] 15
   Disagree [ ] 46  Strongly disagree [ ] 8

8. I cannot afford the time and money it would take in preparing for a science occupation.
   
   Strongly agree [ ] 23  Agree [ ] 8  Undecided [ ] 31
   Disagree [ ] 15  Strongly disagree [ ] 23

9. My parents would approve of my going into science.
   
   Strongly agree [ ] 23  Agree [ ] 54  Undecided [ ] 15
   Disagree [ ] 8  Strongly disagree [ ] 0

10. Science is not challenging enough for me.
   
   Strongly agree [ ] 0  Agree [ ] 15  Undecided [ ] 31
   Disagree [ ] 38  Strongly disagree [ ] 15

11. Reading science is difficult.
   
   Strongly agree [ ] 8  Agree [ ] 15  Undecided [ ] 23
   Disagree [ ] 38  Strongly disagree [ ] 15

12. I dislike coming to science class.
   
   Strongly agree [ ] 0  Agree [ ] 8  Undecided [ ] 15
   Disagree [ ] 38  Strongly disagree [ ] 38

13. I read more science materials than I did in 8th grade.
   
   Strongly agree [ ] 8  Agree [ ] 62  Undecided [ ] 27
   Disagree [ ] 4  Strongly disagree [ ] 0
14. I enjoy doing the science experiments.
   Strongly agree 38  Agree 46  Undecided 0
   Disagree 0  Strongly disagree 28

15. What I am learning in science will be useful to me outside school.
   Strongly agree 15  Agree 62  Undecided 8
   Disagree 8  Strongly disagree 0

16. I think about things we learn in science class when I'm not in school.
   Strongly agree 8  Agree 50  Undecided 12
   Disagree 12  Strongly disagree 8

17. Experiments are hard to understand.
   Strongly agree 8  Agree 31  Undecided 8
   Disagree 23  Strongly disagree 15

18. The things we do in this class are useless.
   Strongly agree 8  Agree 8  Undecided 0
   Disagree 31  Strongly disagree 46

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.
   Strongly agree 8  Agree 46  Undecided 23
   Disagree 15  Strongly disagree 0

20. I am learning a lot in science this year.
   Strongly agree 15  Agree 69  Undecided 8
   Disagree 0  Strongly disagree 0

21. I do not want to take any more science classes than I have to take.
   Strongly agree 15  Agree 31  Undecided 31
   Disagree 15  Strongly disagree 0

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

   Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   Yes 0  Undecided 46  No 38

2. You could perform interesting lab experiments.
   Yes 46  Undecided 35  No 8

3. Visiting speakers presented interesting and exciting demonstrations and lectures to the class.
   Yes 38  Undecided 31  No 15

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, chalkborad, models, transparencies, films, student demonstrations, etc.).
   Yes 46  Undecided 23  No 15
5. Field trips, which are related to what you are studying are taken frequently.
   Yes 62  Undecided 15  No 23

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
   Yes 50  Undecided 15  No 31

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.
   Yes 69  Undecided 23  No 8

8. What you are studying is frequently related to careers (jobs) that you may pursue.
   Yes 62  Undecided 15  No 23

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
   Yes 31  Undecided 15  No 54

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
    Yes 38  Undecided 31  No 31

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 23  Undecided 54  No 27

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 46  Undecided 50  No 4

13. You were given class time to work on science projects.
    Yes 62  Undecided 19  No 15

14. You were encouraged by your teacher to enroll in the course.
    Yes 46  No 54
SCIENCE SURVEY QUESTIONNAIRE

Male % Response by Black 10th Grade Females Female

PART ONE:
A. Please use checks and short answers for this portion.
1. What is your present grade level?
   - 9th ___ 10th ___ 11th ___ 12th ___
2. What science courses or courses are you taking now?
   Biological Science - 64.7  Physical Science - 18
3. What is your approximate grade average in the science course(s)?
   A 12  B 41  C 29  D 18  F 6
4. Do you plan to take another science course?
   Yes 29  Undecided 12  No 59
5. What math-courses have you taken and are presently taking?
   General Math I - 24  Algebra I - 35  Geometry - 0
   General Math II - 71  Algebra II - 12  Other - 6
B. Please check the answer that most agrees with how you feel about science at this school.
6. Science courses are boring.
   Strongly agree 6  Agree 18  Undecided 29
   Disagree 48  Strongly disagree 12
7. Learning science primarily involves memorizing terms and words.
   Strongly agree 18  Agree 59  Undecided 12
   Disagree 6  Strongly disagree 6
8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree 6  Agree 18  Undecided 41
   Disagree 48  Strongly disagree 12
9. My parents would approve of my going into science.
   Strongly agree 12  Agree 53  Undecided 18
   Disagree 12  Strongly disagree 6
10. Science is not challenging enough for me.
    Strongly agree 9  Agree 12  Undecided 24
    Disagree 59  Strongly disagree 6
11. Reading science is difficult.
    Strongly agree 0  Agree 24  Undecided 12
    Disagree 47  Strongly disagree 12
12. I dislike coming to science class.
    Strongly agree 12  Agree 18  Undecided 16
    Disagree 35  Strongly disagree 29
13. I read more science materials than I did in 8th grade.
    Strongly agree 6  Agree 35  Undecided 0
    Disagree 41  Strongly disagree 12
<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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<tbody>
<tr>
<td>14. I enjoy doing the science experiments.</td>
<td>29</td>
<td>47</td>
<td>0</td>
<td>18</td>
<td>0</td>
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<tr>
<td>15. What I am learning in science will be useful to me outside school.</td>
<td>17 9</td>
<td>41</td>
<td>12</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>16. I think about things we learn in science class when I'm not in school.</td>
<td>18 27</td>
<td>29</td>
<td>6</td>
<td>35</td>
<td>6</td>
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<tr>
<td>17. Experiments are hard to understand.</td>
<td>0</td>
<td>6</td>
<td>18</td>
<td>53</td>
<td>18</td>
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<tr>
<td>18. The things we do in this class are useless.</td>
<td>0</td>
<td>41</td>
<td>24</td>
<td>41</td>
<td>24</td>
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<tr>
<td>19. Taking upper-level science courses will help to enable a student to</td>
<td>6</td>
<td>47</td>
<td>12</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>20. I am learning a lot in science this year.</td>
<td>18</td>
<td>47</td>
<td>6</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>21. I do not want to take any more science classes than I have to take.</td>
<td>18</td>
<td>41</td>
<td>12</td>
<td>18</td>
<td>6</td>
</tr>
</tbody>
</table>

**PART TWO:**

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   - Yes 35
   - Undecided 23
   - No 35

2. You could perform interesting lab experiments.
   - Yes 54
   - Undecided 23
   - No 12

3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
   - Yes 65
   - Undecided 18
   - No 12

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
   - Yes 65
   - Undecided 18
   - No 12
5. Field trips, which are related to what you are studying are taken frequently.
   Yes 88 Undecided 0 No 12

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
   Yes 82 Undecided 12 No 6

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.
   Yes 65 Undecided 23 No 12

8. What you are studying is frequently related to careers (jobs) that you may pursue.
   Yes 59 Undecided 29 No 12

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
   Yes 35 Undecided 29 No 35

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
    Yes 65 Undecided 23 No 12

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 47 Undecided 41 No 12

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 65 Undecided 18 No 18

13. You were given class time to work on science projects.
    Yes 65 Undecided 18 No 18

14. You were encouraged by your teacher to enroll in the course.
    Yes 47 No 53
SCIENCE SURVEY QUESTIONNAIRE
Male _____  % Response by White 9th Grade Males  Female _____

PART ONE:
A. Please use checks and short answers for this portion.

1. What is your present grade level?
   9th _____ 10th _____ 11th _____ 12th _____

2. What science courses or course are you taking now?
   Biological Science - 43.3  Physical Science - 56.7

3. What is your approximate grade average in the science course(s)?
   A 14.5  B 23.3  C 23.2  D 17.4  F 21.7

4. Do you plan to take another science course?
   Yes 65.7  Undecided 23.4  No 10.4

5. What math-courses have you taken and are presently taking?
   General Math I 45.5  Algebra I 51.5  Geometry 0
   General Math II 1.5  Algebra II 0  Other 1.5

B. Please check the answer that most agrees with how you feel about science at this school.

6. Science courses are boring.
   Strongly agree 9  Agree 33  Undecided 31
   Disagree 20  Strongly disagree 7

7. Learning science primarily involves memorizing terms and words.
   Strongly agree 27  Agree 49  Undecided 27
   Disagree 9  Strongly disagree 7

8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree 9  Agree 24  Undecided 40
   Disagree 20  Strongly disagree 5

9. My parents would approve of my going into science.
   Strongly agree 35  Agree 49  Undecided 20
   Disagree 11  Strongly disagree 5

10. Science is not challenging enough for me.
    Strongly agree 5  Agree 13  Undecided 11
    Disagree 42  Strongly disagree 16

11. Reading science is difficult.
    Strongly agree 20  Agree 24  Undecided 16
    Disagree 25  Strongly disagree 4

12. I dislike coming to science class.
    Strongly agree 13  Agree 18  Undecided 15
    Disagree 31  Strongly disagree 11

13. I read more science materials than I did in 8th grade.
    Strongly agree 31  Agree 45  Undecided 20
    Disagree 13  Strongly disagree 15
14. I enjoy doing the science experiments.

<table>
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<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>55</td>
<td>9</td>
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</table>

15. What I am learning in science will be useful to me outside school.

<table>
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<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>67</td>
<td>25</td>
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</table>

16. I think about things we learn in science class when I'm not in school.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>50</td>
<td>29</td>
</tr>
</tbody>
</table>

17. Experiments are hard to understand.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>20</td>
<td>16</td>
</tr>
</tbody>
</table>

18. The things we do in this class are useless.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>11</td>
<td>13</td>
</tr>
</tbody>
</table>

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
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<tbody>
<tr>
<td>25</td>
<td>61</td>
<td>13</td>
</tr>
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</table>

20. I am learning a lot in science this year.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>51</td>
<td>20</td>
</tr>
</tbody>
</table>

21. I do not want to take any more science classes than I have to take.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>27</td>
<td>36</td>
<td>25</td>
</tr>
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</table>

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

   Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.

   Yes | Undecided | No
   | 44  | 31    | 49

2. You could perform interesting lab experiments.

   Yes | Undecided | No
   | 84  | 24    | 16

3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.

   Yes | Undecided | No
   | 55  | 29    | 10

4. The teacher uses a variety of ways to teach the course—(i.e. short lectures, demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).

   Yes | Undecided | No
   | 80  | 29    | 13
5. Field trips, which are related to what you are studying are taken frequently
   Yes 64.7  Undecided 8.8  No 36.5

6. You were allowed to take a similar make-up test on any test that you make
   a grade that is below "C".
   Yes 52.4  Undecided 7.4  No 35.3

7. You were encouraged by your teacher to come in before or after school or
   call the teacher at home any time you needed help with the course.
   Yes 63.2  Undecided 13.2  No 23.5

8. What you are studying is frequently related to careers (jobs) that you may
   pursue.
   Yes 46.3  Undecided 20.9  No 32.8

9. A friend, who had taken the course, told you that the course is hard and
   required a lot of work.
   Yes 30.9  Undecided 32.4  No 36.8

10. You were allowed to do small group work when you felt the need for further
    discussion for an assignment.
    Yes 56.7  Undecided 28.4  No 14.9

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 61.8  Undecided 19.1  No 19.1

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 57.4  Undecided 20.6  No 22.1

13. You were given class time to work on science projects.
    Yes 61.8  Undecided 12.6  No 20.6

14. You were encouraged by your teacher to enroll in the course.
    Yes 48.5  No 51.5
SCIENCE SURVEY QUESTIONNAIRE

Male________% Response by White 9th Grade Females Female________

PART ONE:

A. Please use checks and short answers for this portion.

1. What is your present grade level?
   9th _____ 10th _____ 11th _____ 12th _____

2. What science courses or course-are you taking now?
   Biological Science - 25   Physical Science - 60

3. What is your approximate grade average in the science course(s)?
   A 15   B 21   C 23   D 23   F 13

4. Do you plan to take another science course?
   Yes 61   Undecided 35   No 13

5. What math courses have you taken and are presently taking?
   General Math I - 72   Algebra I - 35   Geometry - 0
   General Math II - 1   Algebra II - 0   Other - 2

B. Please check the answer that most agrees with how you feel about science at this school.

6. Science courses are boring.
   Strongly agree 8   Agree 28   Undecided 29
   Disagree 20   Strongly disagree 3

7. Learning science primarily involves memorizing terms and words.
   Strongly agree 3   Agree 48   Undecided 16
   Disagree 17   Strongly disagree 3

8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree 3   Agree 16   Undecided 32
   Disagree 33   Strongly disagree 5

9. My parents would approve of my going into science.
   Strongly agree 12   Agree 49   Undecided 19
   Disagree 4   Strongly disagree 3

10. Science is not challenging enough for me.
    Strongly agree 3   Agree 19   Undecided 16
    Disagree 37   Strongly disagree 19

11. Reading science is difficult.
    Strongly agree 7   Agree 24   Undecided 16
    Disagree 39   Strongly disagree 9

12. I dislike coming to science class.
    Strongly agree 11   Agree 24   Undecided 21
    Disagree 21   Strongly disagree 12

13. I read more science materials than I did in 8th grade.
    Strongly agree 25   Agree 37   Undecided 8
    Disagree 15   Strongly disagree 4
14. I enjoy doing the science experiments.
   | Strongly agree | Agree | Undecided |
   | 9              | 52    | 15         |
   | Disagree       | 9     | 1           |

15. I think what I am learning in science will be useful to me outside school.
   | Strongly agree | Agree | Undecided |
   | 9              | 35    | 23         |
   | Disagree       | 17    | 4           |

16. I think about things we learn in science class when I'm not in school.
   | Strongly agree | Agree | Undecided |
   | 5              | 39    | 16         |
   | Disagree       | 23    | 7           |

17. Experiments are hard to understand.
   | Strongly agree | Agree | Undecided |
   | 1              | 7     | 31         |
   | Disagree       | 4     | 7           |

18. The things we do in this class are useless.
   | Strongly agree | Agree | Undecided |
   | 7              | 11    | 21         |
   | Disagree       | 40    | 9           |

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.
   | Strongly agree | Agree | Undecided |
   | 8              | 47    | 7          |
   | Disagree       | 7     | 1           |

20. I am learning a lot in science this year.
   | Strongly agree | Agree | Undecided |
   | 13             | 39    | 21         |
   | Disagree       | 9     | 7           |

21. I do not want to take any more science classes than I have to take.
   | Strongly agree | Agree | Undecided |
   | 25             | 29    | 16         |
   | Disagree       | 11    | 8           |

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   | Yes | Undecided | No |
   | 32  | 33         | 24 |

2. You could perform interesting lab experiments.
   | Yes | Undecided | No |
   | 53  | 24         | 19 |

3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
   | Yes | Undecided | No |
   | 43  | 20         | 27 |

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
   | Yes | Undecided | No |
   | 60  | 23         | 7  |
5. Field trips, which are related to what you are studying are taken frequently.
   Yes 60  Undecided 7  No 23

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
   Yes 53  Undecided 13  No 23

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.
   Yes 49  Undecided 19  No 21

8. What you are studying is frequently related to careers (jobs) that you may pursue.
   Yes 44  Undecided 24  No 21

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
   Yes 33  Undecided 20  No 36

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
    Yes 43  Undecided 16  No 20

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 52  Undecided 20  No 12

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 51  Undecided 25  No 13

13. You were given class time to work on science projects.
    Yes 56  Undecided 17  No 17

14. You were encouraged by your teacher to enroll in the course.
    Yes 41  No 41
PART ONE:
A. Please use checks and short answers for this portion.

1. What is your present-grade level?
   9th ____ 10th ____ 11th ____ 12th ____

2. What science courses or course are you taking now?
   Biological Science = 58  Physical Science = 42

3. What is your approximate grade average in the science course(s)?
   A 18.8  B 24.6  C 29  D 14.5  F 13

4. Do you plan to take another science course?
   Yes 41.4  Undecided 35.7  No 22.9

5. What math courses have you taken and are presently taking?
   General Math I ———— 25  Algebra I ———— 44.4  Geometry 1.4
   General Math II ———— 13.9  Algebra II ———— 8.3  Other ———— 6.9

B. Please check the answer that most agrees with how you feel about science at this school.

6. Science courses are boring.
   Strongly agree ———— 6.9  Agree ———— 16.7  Undecided ———— 36.1
   Disagree ———— 33.3  Strongly disagree ———— 6.9

7. Learning science primarily involves memorizing terms and words.
   Strongly agree ———— 9.7  Agree ———— 31.9  Undecided ———— 16.7
   Disagree ———— 36.1  Strongly disagree ———— 5.6

8. I cannot afford the time and money it would take in preparing for a science occupation.
   Strongly agree ———— 11.1  Agree ———— 34.7  Undecided ———— 40.3
   Disagree ———— 31.9  Strongly disagree ———— 5.6

9. My parents would approve of my going into science.
   Strongly agree ———— 15.3  Agree ———— 34.7  Undecided ———— 37.5
   Disagree ———— 9.7  Strongly disagree ———— 2.8

10. Science is not challenging enough for me.
    Strongly agree ———— 8.5  Agree ———— 16.9  Undecided ———— 16.9
        Disagree ———— 38  Strongly disagree ———— 19.7

11. Reading science is difficult.
    Strongly agree ———— 5.6  Agree ———— 28.2  Undecided ———— 26.8
        Disagree ———— 35.2  Strongly disagree ———— 4.2

12. I dislike coming to science class.
    Strongly agree ———— 5.6  Agree ———— 13  Undecided ———— 22.2
        Disagree ———— 48.6  Strongly disagree ———— 9.7

13. I read more science materials than I did in 8th grade.
    Strongly agree ———— 18.1  Agree ———— 40.3  Undecided ———— 9.7
        Disagree ———— 19.4  Strongly disagree ———— 12.5
14. I enjoy doing the science experiments.
   - Strongly agree: 28
   - Agree: 49
   - Undecided: 7
   - Disagree: 11
   - Strongly disagree: 6

15. What I am learning in science will be useful to me outside school.
   - Strongly agree: 15
   - Agree: 46
   - Undecided: 21
   - Disagree: 11
   - Strongly disagree: 7

16. I think about things we learn in science class when I'm not in school.
   - Strongly agree: 7
   - Agree: 47
   - Undecided: 15
   - Disagree: 22
   - Strongly disagree: 8

17. Experiments are hard to understand.
   - Strongly agree: 4
   - Agree: 20
   - Undecided: 30
   - Disagree: 37
   - Strongly disagree: 9

18. The things we do in this class are useless.
   - Strongly agree: 7
   - Agree: 7
   - Undecided: 25
   - Disagree: 38
   - Strongly disagree: 24

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.
   - Strongly agree: 25
   - Agree: 41
   - Undecided: 22
   - Disagree: 7
   - Strongly disagree: 1

20. I am learning a lot in science this year.
   - Strongly agree: 11
   - Agree: 51
   - Undecided: 18
   - Disagree: 17
   - Strongly disagree: 3

21. I do not want to take any more science classes than I have to take.
   - Strongly agree: 21
   - Agree: 28
   - Undecided: 25
   - Disagree: 17
   - Strongly disagree: 10

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   - Yes: 26
   - Undecided: 31
   - No: 43

2. You could perform interesting lab experiments.
   - Yes: 61
   - Undecided: 14
   - No: 25

3. Visiting speakers presented interesting and exciting demonstrations and lectures to the class.
   - Yes: 44
   - Undecided: 26
   - No: 29

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
   - Yes: 53
   - Undecided: 26
   - No: 21
5. Field trips, which are related to what you are studying are taken frequently
   Yes 88  Undecided 0  No 12

6. You were allowed to take a similar make-up test on any test that you make
   a grade that is below "C".
   Yes 50  Undecided 22  No 28

7. You were encouraged by your teacher to come in before or after school or
   call the teacher at home any time you needed help with the course.
   Yes 410  Undecided 26  No 33

8. What you are studying is frequently related to careers (jobs) that you may
   pursue.
   Yes 47  Undecided 32  No 21

9. A friend, who had taken the course, told you that the course is hard and
   required a lot of work.
   Yes 24  Undecided 31  No 416

10. You were allowed to do small group work when you felt the need for further
    discussion for an assignment.
    Yes 50  Undecided 35  No 15

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 53  Undecided 33  No 141

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 51  Undecided 24  No 25

13. You were given class time to work on science projects.
    Yes 58  Undecided 25  No 17

14. You were encouraged by your teacher to enroll in the course.
    Yes 341  No 65
**SCIENCE SURVEY QUESTIONNAIRE**

**Male** % Response by White 10th Grade Females  **Female**

**PART ONE:**

A. Please use checks and short answers for this portion.

1. What is your present grade level?
   - 9th
   - 10th
   - 11th
   - 12th

2. What science courses or courses are you taking now?
   - Biological Science: 66.7
   - Physical Science: 33.3

3. What is your approximate grade average in the science course(s)?
   - A: 14.3
   - B: 32.7
   - C: 35.7
   - D: 12.2
   - F: 5.1

4. Do you plan to take another science course?
   - Yes: 27
   - Undecided: 34
   - No: 39

5. What math courses have you taken and are presently taking?
   - General Math I: 0
   - Algebra I: 0
   - Geometry: 0
   - General Math II: 33
   - Algebra II: 64
   - Other: 0

B. Please check the answer that most agrees with how you feel about science at this school.

6. Science courses are boring.
   - Strongly agree: 4
   - Agree: 18
   - Undecided: 37
   - Disagree: 38
   - Strongly disagree: 3

7. Learning science primarily involves memorizing terms and words.
   - Strongly agree: 4
   - Agree: 41
   - Undecided: 10
   - Disagree: 39
   - Strongly disagree: 6

8. I cannot afford the time and money it would take in preparing for a science occupation.
   - Strongly agree: 5
   - Agree: 18
   - Undecided: 32
   - Disagree: 33
   - Strongly disagree: 12

9. My parents would approve of my going into science.
   - Strongly agree: 9
   - Agree: 46
   - Undecided: 36
   - Disagree: 5
   - Strongly disagree: 3

10. Science is not challenging enough for me.
    - Strongly agree: 7
    - Agree: 14
    - Undecided: 19
    - Disagree: 44
    - Strongly disagree: 16

11. Reading science is difficult.
    - Strongly agree: 2
    - Agree: 15
    - Undecided: 20
    - Disagree: 55
    - Strongly disagree: 7

12. I dislike coming to science class.
    - Strongly agree: 8
    - Agree: 19
    - Undecided: 28
    - Disagree: 34
    - Strongly disagree: 11

13. I read more science materials than I did in 8th grade.
    - Strongly agree: 13
    - Agree: 32
    - Undecided: 17
    - Disagree: 32
    - Strongly disagree: 6
14. I enjoy doing the science experiments.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>54</td>
<td>11</td>
<td>8</td>
<td>5</td>
</tr>
</tbody>
</table>

15. What I am learning in science will be useful to me outside school.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
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</thead>
<tbody>
<tr>
<td>10</td>
<td>53</td>
<td>19</td>
<td>14</td>
<td>4</td>
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</table>

16. I think about things we learn in science class when I'm not in school.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
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</thead>
<tbody>
<tr>
<td>6</td>
<td>45</td>
<td>6</td>
<td>31</td>
<td>28</td>
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</tbody>
</table>

17. Experiments are hard to understand.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>12</td>
<td>28</td>
<td>47</td>
<td>9</td>
</tr>
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</table>

18. The things we do in this class are useless.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>8</td>
<td>23</td>
<td>50</td>
<td>17</td>
</tr>
</tbody>
</table>

19. Taking upper-level science courses will help to enable a student to do well in college and on non-college related jobs.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>43</td>
<td>28</td>
<td>9</td>
<td>2</td>
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</tbody>
</table>

20. I am learning a lot in science this year.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>57</td>
<td>22</td>
<td>11</td>
<td>3</td>
</tr>
</tbody>
</table>

21. I do not want to take any more science classes than I have to take.

<table>
<thead>
<tr>
<th>Strongly agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>25</td>
<td>21</td>
<td>24</td>
<td>1</td>
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</table>

PART TWO:

A. Please check the answer that most agrees with how you feel about enrolling in an upper level science course.

Would you enroll in an upper level science course (Chemistry, Physics, Botany, Zoology, or Human Physiology) if:

1. The course was individualized.
   - Yes 35
   - Undecided 39
   - No 26

2. You could perform interesting lab experiments.
   - Yes 64
   - Undecided 26
   - No 10

3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
   - Yes 42
   - Undecided 29
   - No 29

4. The teacher uses a variety of ways to teach the course (i.e. short lectures, demonstrations, chalk board, models, transparencies, films, student demonstrations, etc.).
   - Yes 66
   - Undecided 20
   - No 14
5. Field trips, which are related to what you are studying are taken frequently.
   Yes 75  Undecided 10  No 15

6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
   Yes 60  Undecided 19  No 20

7. You were encouraged by your teacher to come in before or after school or call the teacher at home any time you needed help with the course.
   Yes 59  Undecided 21  No 14

8. What you are studying is frequently related to careers (jobs) that you may pursue.
   Yes 53  Undecided 20  No 27

9. A friend, who had taken the course, told you that the course is hard and required a lot of work.
   Yes 20  Undecided 44  No 36

10. You were allowed to do small group work when you felt the need for further discussion for an assignment.
    Yes 57  Undecided 31  No 12

11. If time was provided to discuss topics you were interested in pursuing.
    Yes 62  Undecided 24  No 14

12. If you were allowed to select some of the topics to be discussed in class.
    Yes 60  Undecided 28  No 46

13. You were given class time to work on science projects.
    Yes 58  Undecided 25  No 17

14. You were encouraged by your teacher to enroll in the course.
    Yes 58  No 41
FOOTNOTE REFERENCES


12Ibid., p. 243.

13Ibid., p. 253.