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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

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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."¹

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 advance 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.⁶

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.⁷

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 dispels 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.⁸

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),¹¹ degrees of freedom (the number of values of an observation which are free to vary),¹² significance (refers to the probability of error),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).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

Science Courses	Total Number of Students	Total Black	Total White	% Black	% White
General Science	290	66	224	22.7	77.2
General Biology	157	47	110	29.9	70.0
Advance Biology	74	3	71	4.0	95.9
Health & Hygiene	52	11	41	21.1	78.8
Ecology	72	16	56	22.2	77.7
Botany	29	3	26	10.3	89.6
Zoology	29	1	28	3.4	96.5
Chemistry	56	5	51	8.9	91.0
Physics	12	1	11	8.3	91.6
Human Physiology	15	2	13	13.3	86.6
Totals	786	155	631		

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

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-0.2823	.154	15
8	-0.2795	.147	16
9	0.4684	.034*	16
11	-0.3480	.093	16
12	-0.1098	.343	16
14	0.2488	.196	14
21	-0.1367	.321	14

Item #3, Part I with:

Part II

2	0.2545	.190	14
3	0.2801	.166	14
5	0.4237	.058	15
9	0.1955	.234	16
12	0.3317	.105	16

*Indicates an acceptable level of significance

TABLE III. PEARSON CORRELATION COEFFICIENT

Black 9th Grade Females
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.4390	.051*	15
8	-.1705	.289	13
9	.5052	.027*	15
11	-.3795	.081	15
12	-.4423	.049*	15
14	.0864	.385	14
21	-.4461	.055*	14

Item #3, Part I with:

Part II

2	.5447	.022*	14
3	.1933	.254	14
5	.1753	.266	15
9	.0956	.367	15
12	.5130	.030*	14

*Indicates acceptable levels of significance.

TABLE IV: PEARSON CORRELATION COEFFICIENT

Black 10th Grade Females
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.1807	.244	17
8	-.1642	.264	17
9	-.0343	.448	17
11	-.3733	.070	17
12	-.4284	.043*	17
14	-.0487	.429	16
21	-.3944	.065	16

Item #3, Part I with:

Part II

2	-.0436	.436	16
3	.1149	.336	16
5	.2405	.176	17
9	.2613	.156	17
12	.3287	.099	17

*Indicates an acceptable level of significance.

TABLE V. CORRELATION COEFFICIENT (PEARSON)

Black 10th Grade Males
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.3131	.078	22
8	-.3760	.047*	21
9	.1897	.205	21
11	-.5524	.005*	21
12	-.3421	.065	21
14	-.0713	.386	19
21	-.3675	.061	19

Item #3, Part I with:

Part II

2	.0746	.381	19
3	-.0672	.392	19
5	.1853	.211	21
9	-.0780	.368	21
12	.2939	.098	21

*Indicates an acceptable level of significance.

TABLE VI: PEARSON CORRELATION COEFFICIENT

White 9th Grade Females
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.5945	.001*	81
8	-.2791	.006*	81
9	.1670	.068	81
11	.1650	.071	81
12	-.5074	.001*	80
14	.2482	.013*	81
21	-.4285	.001*	80

Item #3, Part I with:

Part II

2	.2994	.003*	81
3	.2191	.025*	80
5	.2138	.028*	80
9	.2191	.025*	81
12	.3461	.001*	81

*Indicates an acceptable level of significance.

TABLE VII: PEARSON CORRELATION COEFFICIENT

White 9th Grade Males
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.4557	.001*	69
8	-.3865	.001*	69
9	.3549	.001*	69
11	-.2053	.045*	69
12	-.5105	.001*	69
14	.4478	.001*	68
21	-.4606	.001*	67

Item #3 with:

Part II

2	.3934	.001*	69
3	.2632	.014*	69
5	.3964	.001*	68
9	.3227	.004*	68
12	.3822	.001*	68

*Indicates an acceptable level of significance.

TABLE VIII. PEARSON CORRELATION COEFFICIENT

White 10th Grade Males
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.3674	.001*	69
8	-.2572	.016*	69
9	.1141	.175	69
11	-.3063	.006*	68
12	-.3221	.003*	69
14	-.0142	.454	69
21	-.4627	.001*	69

Item #3, Part I with:

Part II

2	.1551	.102	69
3	.2913	.008	69
5	.0899	.231	69
9	.1611	.093	69
12	.2480	.021*	68

*Indicates an acceptable level of significance.

TABLE IX: PEARSON CORRELATION COEFFICIENT

White 10th Grade Females
Science Survey Questionnaire

Part I

Item #3 with:

Item #	Correlation Coefficient	Significance	# of Cases
6	-.2114	.018*	98
8	-.1036	.155	98
9	.1535	.067	97
11	.0217	.416	98
12	-.2558	.006*	97
14	.0117	.455	97
21	-.1714	.047*	97

Item #3, Part I with:

Part II

2	.1120	.137	97
3	.0346	.368	97
5	.2596	.005	98
9	.0925	.184	97
12	.1509	.069	98

*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

Second Number Equals Significance Level

First Number Equals Correlation Coefficient

Part I

Item	8	10	12	15	16	17	18	19	20	21
6	.6066 .0080	.4544 .0440	.4736 .0370				.4974 .0420			
7				.4953 .0360	.4837 .0400	.7152 .0020	.4405 .0570	.5432 .0220	.5758 .0160	
9				.7222 .0020	.7222 .0020			.4752 .0430		
10	.5991 .0070						.6037 .0110			
11		.5885 .0080				.4721 .0440	.7252 .0020			
13									.5456 .0220	
14			.5556 .2000		.5286 .0260			.8290 .0010		
15					.7747 .0010	.5068 .0110		.7126 .0020		
16						.5805 .0150		.6950 .0030		
17							.5672 .0170	.5352 .0240	.5457 .0220	

TABLE X-a

Part I

Item	6	9	10	12	13	14	15	16	17	18	19	21
1	-.5071			-.5801	-.5376							
	.0380			.0150	.0240							
2		.5440		-.5248	.7144					-.4672	.5745	
		.0220		.0270	.0020					.0460	.0160	
7	-.4899				-.4426	.4606		.4569			.4556	
	.0320				.0430	.0490		.0500			.0510	
8		.4678	-.4405		.4885	.7690	.7326	.6346			.7189	
		.0340	.0440		.0380	.0010	.0010	.0070			.0020	
9											.5026	
											.0280	
11	-.5116								.5187			
	.0260								.0290			
12				-.6372	.6840	.5570	.4735				.7525	.4288
				.0040	.0030	.0190	.0440				.0010	.0550
13	-.4775		-.5502									
	.0360		.0140									
14	-.6163	.4357					.4500				.5547	
	.0070	.0460					.0530				.0160	

Part II

TABLE XI: SIGNIFICANT CORRELATIONS

Black 9th Grade Females
 First Number Equals Correlation Coefficient Second Number Equals Significance Level

Part I

Item	11	12	15	18	19	20	21
4	-.6453 .0030	-.4120 .0560			.5616 .0150		-.4831 .0290
6			-.6987 .0020		-.4395 .0510	.4947 .0300	.4494 .0460
7				-.5212 .0230			
8			.5600 .0190	.4421 .0570			
9					.4456 .0480		
10					-.5145 .0250		-.4174 .0540
11		.4172 .0540					.4166 .0540
17					-.4566 .0440		
18					.4741 .0370		.4741 .0370
19							-.6688 .0030

TABLE XI-b

Part I

Item	4	6	8	10	11	12	14	16	17	18	19	20	21
2								.6212 .0070				.6916 .0020	
6											.7842 .0010		-.4572 .0420
7			-.4995 .0340							-.4516 .0460	.5910 .0100		-.4894 .0320
8							.4707 .0380		-.5580 .0150				
9							.4901 .0320		-.5810 .0120				
10				.4557 .0380		-.5402 .0150							
11			-.4679 .0460					.7097 .0020					
12					-.5031 .0280		.5734 .0160						
13			-.4293 .0550										
14	.4583 .0430		.5330 .0300	.4804 .0350								.4446 .0560	

Part
II

TABLE XII: SIGNIFICANT CORRELATIONS
 Black 10th Grade Males
 Second Number Equals Significance Level

Item	7	9	11	12	15	17	18	19	20	21
			Part I							
4		-.3864 .0380		-.3483 .0560						
6	.4677 .0140		.3481 .0560	.5249 .0060	-.5303 .0080		.4834 .0150		-.4547 .0220	
7				.4931 .0100	-.3782 .0500		.3897 .0450			
8						.4263 .0300				.3869 .0460
9							-.4399 .0260			
10	.3879 .0370			.3615 .0490			.3804 .0490			
11				.4235 .0250	-.3941 .0430	.4637 .0200	.3957 .0420			
12					-.4662 .0190		.4574 .0210		-.5139 .0100	-.4748 .0170
13					.4804 .0160			.4474 .0240		
14						-.4842 .0150				
15							-.4048 .0380	.7095 .0010	.4938 .0130	.4184 .0370
16				-.4646 .0200	.5710 .0040				.6819 .0010	.5977 .0460
17							.5982 .0410			
20										.6668 .0010

Part I

TABLE XII-c

Part I

Item	4	6	8	9	11	12	14	16	17	20	21
1	.4972 .0130										
2			-.3977 .0460		-.4005 .0400			.4444 .0280		.6540 .0010	
4							-.3877 .0460				
6						.3652 .0520					
7		-.4375 .0210		.3446 .0580							
8				.4760 .0130						-.3994 .0410	
9				.3652 .0470							
12					-.3456 .0580						
13	-.3461 .0570								-.5222 .0090		
14										.3780 .0410	

Part II

TABLE XIII: SIGNIFICANT CORRELATION
 Black 10th Grade Females
 Second Number Equals Significance Level

Item	8	9	10	12	14	15	16	17	18	19	20	21
4	-.4354 .0400			-.4627 .0310	.5096 .0220	.6838 .0020	.5123 .0210		-.4205 .0590		.4850 .0280	-.8433 .0010
6		-.5486 .0110			-.5132 .0210							
7				-.8104 .0010		.5469 .0140						
8												.5710 .0100
9			-.4201 .0470							.5316 .0210		
11							-.4576 .0370		.7627 .0010			
12				-.4406 .0440	-.6912 .0020				.4507 .0460	-.6399 .0040		.5307 .0170
13												-.5732 .0160
14												-.6476 .0030
15							.4462 .0420				.4600 .0360	.4677 .0390
16								-.5809 .0090	-.4258 .0570		.6447 .0040	-.4575 .0370
17												.4097 .0580
18										-.5221 .0230		.5689 .0130
20												.4747 .0370

TABLE XIII-d

Item	Part I												
	4	6	8	10	11	12	13	14	15	16	17	20	21
1	.4660	-.4583 .0370	-.4706 .0330				-.4884 .0320	.4910 .0270	.6027 .0070		-.4689 .0330	.4636 .0350	.5466 .0170
2				.4529 .0390									
3	.4660 .0340	-.4176 .0540				-.5063 .0270	.4797 .0300		.8782 .0010				-.4919 .0260
4						-.7273 .0010							-.4162 .0540
6		-.4202 .0470					.5152 .0200						
7							.4725 .0320						-.5276 .0180
8	.4124 .0500		-.4531 .0340		-.5392 .0130				.4697 .0330				-.5276 .0180
9	.7063 .0010								.6723 .0020				
10		-.4221 .0460					.7385 .0010						
11	.4614 .0310		-.5753 .0080						.5106 .0220				-.5081 .0220
12			-.4064 .0530		-.4837 .0250				.4498 .0400				-.5072 .0220
13	.4385 .0450								.6466 .0050			-.6233 .0070	-.5213 .0230
14	.4429 .0370			.4134 .0500			.4209 .0520						

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

Variables	Black	White	χ^2	Degrees of Freedom	Significance
Interest in Science	27.27	27.25	4.53	4	.370
Difficulty of Science	31.13	26.35	10.52	4	.035
Worthwhileness of Science	34.67	31.42	10.58	4	.030
Aptitude in Science	16.30	22.30	9.75	4	.040
Positive Response to Enrolling in Science	59.85	57.40	3.40	2	.480

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 on 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.

A P P E N D I X

*
*

SCIENCE SURVEY QUESTIONNAIRE

Male _____

% Response by Black 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 - 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 lecture, demonstrations, 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

Male _____

% Response by Black 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 - 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	<u>82</u>	Algebra I	<u>0</u>	Geometry	<u>0</u>
General Math II	<u>0</u>	Algebra II	<u>0</u>	Other	<u>6</u>

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

6. Science courses are boring.

Strongly agree	<u>29</u>	Agree	<u>29</u>	Undecided	<u>18</u>
Disagree	<u>24</u>	Strongly disagree	<u>0</u>		

7. Learning science primarily involves memorizing terms and words.

Strongly agree	<u>0</u>	Agree	<u>53</u>	Undecided	<u>24</u>
Disagree	<u>18</u>	Strongly disagree	<u>0</u>		

8. I cannot afford the time and money it would take in preparing for a science occupation.

Strongly agree	<u>0</u>	Agree	<u>24</u>	Undecided	<u>41</u>
Disagree	<u>29</u>	Strongly disagree	<u>0</u>		

9. My parents would approve of my going into science.

Strongly agree	<u>6</u>	Agree	<u>41</u>	Undecided	<u>41</u>
Disagree	<u>6</u>	Strongly disagree	<u>0</u>		

10. Science is not challenging enough for me.

Strongly agree	<u>6</u>	Agree	<u>18</u>	Undecided	<u>24</u>
Disagree	<u>59</u>	Strongly disagree	<u>6</u>		

11. Reading science is difficult.

Strongly agree	<u>18</u>	Agree	<u>12</u>	Undecided	<u>18</u>
Disagree	<u>29</u>	Strongly disagree	<u>12</u>		

12. I dislike coming to science class.

Strongly agree	<u>29</u>	Agree	<u>29</u>	Undecided	<u>18</u>
Disagree	<u>24</u>	Strongly disagree	<u>0</u>		

13. I read more science materials than I did in 8th grade.

Strongly agree	<u>6</u>	Agree	<u>12</u>	Undecided	<u>6</u>
Disagree	<u>12</u>	Strongly disagree	<u>0</u>		

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 47 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 lecture 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
Yes 53 Undecided 24 No 24
6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
Yes 35 Undecided 12 No 53
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 41 Undecided 35 No 24
8. What you are studying is frequently related to careers (jobs) that you may pursue.
Yes 65 Undecided 18 No 24
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.
Yes 47 Undecided 6 No 41
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	<u>11</u>	Algebra I	<u>23</u>	Geometry	<u>0</u>
General Math II	<u>85</u>	Algebra II	<u>4</u>	Other	<u>4</u>

B. Please check the answer that most agrees 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, demonstrations, chalkboard, 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 course 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 35 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 0 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

14. I enjoy doing the science experiments.
 Strongly agree 29 Agree 47 Undecided 0
 Disagree 18 Strongly disagree 0
15. What I am learning in science will be useful to me outside school.
 Strongly agree 12.9 Agree 41 Undecided 12
 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 29 Undecided 6
 Disagree 35 Strongly disagree 6
17. Experiments are hard to understand.
 Strongly agree 0 Agree 6 Undecided 18
 Disagree 53 Strongly disagree 18
18. The things we do in this class are useless.
 Strongly agree 0 Agree 18 Undecided 6
 Disagree 41 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 6 Agree 47 Undecided 12
 Disagree 18 Strongly disagree 6
20. I am learning a lot in science this year.
 Strongly agree 18 Agree 47 Undecided 6
 Disagree 23 Strongly disagree 0
21. I do not want to take any more science classes than I have to take.
 Strongly agree 18 Agree 41 Undecided 12
 Disagree 18 Strongly disagree 6

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.
 Strongly agree 45 Agree 55 Undecided 9
 Disagree 11 Strongly disagree 4
15. What I am learning in science will be useful to me outside school.
 Strongly agree 11 Agree 67 Undecided 25
 Disagree 13 Strongly disagree 11
16. I think about things we learn in science class when I'm not in school.
 Strongly agree 9 Agree 60 Undecided 29
 Disagree 25 Strongly disagree 70
17. Experiments are hard to understand.
 Strongly agree 7 Agree 20 Undecided 16
 Disagree 62 Strongly disagree 16
18. The things we do in this class are useless.
 Strongly agree 5 Agree 11 Undecided 13
 Disagree 56 Strongly disagree 36
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 69 Undecided 13
 Disagree 11 Strongly disagree 7
20. I am learning a lot in science this year.
 Strongly agree 22 Agree 51 Undecided 20
 Disagree 16 Strongly disagree 7
21. I do not want to take any more science classes than I have to take.
 Strongly agree 27 Agree 36 Undecided 25
 Disagree 22 Strongly disagree 13

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 44 Undecided 31 No 49
2. You could perform interesting lab experiments.
 Yes 84 Undecided 24 No 16
3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
 Yes 55 Undecided 29 No 40
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 80 Undecided 29 No 13

5. Field trips, which are related to what you are studying are taken frequently
 Yes 64.7 Undecided 8.8 No 26.5
6. You were allowed to take a similar make-up test on any test that you make a grade that is below "C".
 Yes 57.4 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 17.6 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 - 68

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 | <u>9</u> | Agree | <u>52</u> | Undecided | <u>15</u> |
| Disagree | <u>9</u> | Strongly disagree | <u>4</u> | | |
15. What I am learning in science will be useful to me outside school.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>9</u> | Agree | <u>35</u> | Undecided | <u>23</u> |
| Disagree | <u>17</u> | Strongly disagree | <u>4</u> | | |
16. I think about things we learn in science class when I'm not in school.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>5</u> | Agree | <u>39</u> | Undecided | <u>16</u> |
| Disagree | <u>23</u> | Strongly disagree | <u>7</u> | | |
17. Experiments are hard to understand.
- | | | | | | |
|----------------|-----------|-------------------|----------|-----------|-----------|
| Strongly agree | <u>1</u> | Agree | <u>7</u> | Undecided | <u>31</u> |
| Disagree | <u>45</u> | Strongly disagree | <u>7</u> | | |
18. The things we do in this class are useless.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>7</u> | Agree | <u>11</u> | Undecided | <u>21</u> |
| Disagree | <u>40</u> | Strongly disagree | <u>9</u> | | |
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 | <u>8</u> | Agree | <u>47</u> | Undecided | <u>27</u> |
| Disagree | <u>7</u> | Strongly disagree | <u>1</u> | | |
20. I am learning a lot in science this year.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>13</u> | Agree | <u>39</u> | Undecided | <u>21</u> |
| Disagree | <u>9</u> | Strongly disagree | <u>7</u> | | |
21. I do not want to take any more science classes than I have to take.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>25</u> | Agree | <u>29</u> | Undecided | <u>16</u> |
| Disagree | <u>11</u> | Strongly disagree | <u>8</u> | | |

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:

- The course was individualized.
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>32</u> | Undecided | <u>33</u> | No | <u>24</u> |
|-----|-----------|-----------|-----------|----|-----------|
- You could perform interesting lab experiments.
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>53</u> | Undecided | <u>24</u> | No | <u>19</u> |
|-----|-----------|-----------|-----------|----|-----------|
- Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>43</u> | Undecided | <u>20</u> | No | <u>27</u> |
|-----|-----------|-----------|-----------|----|-----------|
- The teacher uses a variety of ways to teach the course (i.e. short lecture demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
- | | | | | | |
|-----|-----------|-----------|-----------|----|----------|
| Yes | <u>60</u> | Undecided | <u>23</u> | No | <u>7</u> |
|-----|-----------|-----------|-----------|----|----------|

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 55 Undecided 17 No 17
14. You were encouraged by your teacher to enroll in the course.
 Yes 41 No 41

SCIENCE SURVEY QUESTIONNAIRE

Male _____

% Response by White 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 - 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 11.1 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 | <u>28</u> | Agree | <u>49</u> | Undecided | <u>7</u> |
| Disagree | <u>11</u> | Strongly disagree | <u>6</u> | | |
15. What I am learning in science will be useful to me outside school.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>15</u> | Agree | <u>46</u> | Undecided | <u>21</u> |
| Disagree | <u>11</u> | Strongly disagree | <u>7</u> | | |
16. I think about things we learn in science class when I'm not in school.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>7</u> | Agree | <u>47</u> | Undecided | <u>15</u> |
| Disagree | <u>22</u> | Strongly disagree | <u>8</u> | | |
17. Experiments are hard to understand.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>4</u> | Agree | <u>20</u> | Undecided | <u>30</u> |
| Disagree | <u>37</u> | Strongly disagree | <u>9</u> | | |
18. The things we do in this class are useless.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>7</u> | Agree | <u>7</u> | Undecided | <u>25</u> |
| Disagree | <u>38</u> | Strongly disagree | <u>24</u> | | |
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 | <u>25</u> | Agree | <u>44</u> | Undecided | <u>22</u> |
| Disagree | <u>7</u> | Strongly disagree | <u>1</u> | | |
20. I am learning a lot in science this year.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>11</u> | Agree | <u>51</u> | Undecided | <u>18</u> |
| Disagree | <u>17</u> | Strongly disagree | <u>3</u> | | |
21. I do not want to take any more science classes than I have to take.
- | | | | | | |
|----------------|-----------|-------------------|-----------|-----------|-----------|
| Strongly agree | <u>21</u> | Agree | <u>28</u> | Undecided | <u>25</u> |
| Disagree | <u>17</u> | Strongly disagree | <u>10</u> | | |

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 | <u>26</u> | Undecided | <u>31</u> | No | <u>43</u> |
|-----|-----------|-----------|-----------|----|-----------|
2. You could perform interesting lab experiments.
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>61</u> | Undecided | <u>14</u> | No | <u>25</u> |
|-----|-----------|-----------|-----------|----|-----------|
3. Visiting speakers presented interesting and exciting demonstrations and lectures, to the class.
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>44</u> | Undecided | <u>26</u> | No | <u>29</u> |
|-----|-----------|-----------|-----------|----|-----------|
4. The teacher uses a variety of ways to teach the course (i.e. short lecture demonstrations, chalkboard, models, transparencies, films, student demonstrations, etc.).
- | | | | | | |
|-----|-----------|-----------|-----------|----|-----------|
| Yes | <u>53</u> | Undecided | <u>26</u> | No | <u>21</u> |
|-----|-----------|-----------|-----------|----|-----------|

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 40 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 46
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 14
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 34 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 course 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.
 Strongly agree 22 Agree 54 Undecided 11
 Disagree 8 Strongly disagree 5
15. What I am learning in science will be useful to me outside school.
 Strongly agree 10 Agree 53 Undecided 19
 Disagree 14 Strongly disagree 4
16. I think about things we learn in science class when I'm not in school.
 Strongly agree 6 Agree 45 Undecided 6
 Disagree 31 Strongly disagree 11
17. Experiments are hard to understand.
 Strongly agree 3 Agree 12 Undecided 28
 Disagree 47 Strongly disagree 9
18. The things we do in this class are useless.
 Strongly agree 3 Agree 8 Undecided 23
 Disagree 50 Strongly disagree 17
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 43 Undecided 28
 Disagree 9 Strongly disagree 2
20. I am learning a lot in science this year.
 Strongly agree 7 Agree 57 Undecided 22
 Disagree 11 Strongly disagree 3
21. I do not want to take any more science classes than I have to take.
 Strongly agree 24 Agree 25 Undecided 21
 Disagree 24 Strongly disagree 7

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, chalkboard, 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 27 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 FERERENCES

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