What About Becoming a Science Teacher?

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"What ya'll have to go through … Can I say it? Can I say it? (the interviewer nodded) ya'll have to go through hell."

African-American middle school student

Introduction

Who is going to be motivated to seek employment in any educational field with this perception about the teaching environment? Negative views about teaching are prevalent among middle school students and make it difficult to inspire them to want to teach. To lessen the teacher shortage, students need to be influenced to pursue a career in education during their adolescent years.

School systems have struggled with meeting the demand to find qualified teachers. Recent No Child Left Behind (NCLB) legislation has placed current emphasis on securing quality teachers in every classroom and schools are faced

with a difficult task of hiring licensed educators who are knowledgeable in their content area to meet new requirements. Federal NCLB legislation requires all states to guarantee by 2005-2006 that every teacher is highly qualified. This law also zeros in on racial and economic achievement gaps and the under-performance of high-poverty schools where many new teachers begin their classroom careers. State school systems must seize the opportunity afforded by NCLB dollars to help every teacher who enters the profession become highly qualified to teach diverse students and to ensure that teachers remain in the profession once they achieve this level of mastery (Berry, Hopkins-Thompson, and Hoke, 2002). NCLB mandates and the need for licensed teachers in every classroom have placed increased pressure on school systems, especially rural school systems, to recruit and retain teachers. Quality Counts 2003 also revealed that students in high minority, high poverty schools are far more likely to have teachers who are inexperienced or who are not certified in the subject they have been assigned to teach (Berry, Luczak, and Norton, 2002). For over the past 40 years, teaching positions in some content areas, such as science, have been hard to fill (Hind, 2002) and to offset this continual

shortage, some districts are trying to recruit potential teachers as early as middle school.

The goal of East Carolina Reach Up Program was to facilitate African-American middle school students' interest in science, expose them to science-related careers, and increase student performance on science-related assessments. This research project examined African-American middle school students' perceptions of science and science-related careers, which included teaching science.

The Need for Quality Teachers

One area of concern in education is with high student achievement, which has consistently been linked with teacher expertise in content knowledge. According to six NAEP data sets, and a state's percentage of teachers with regular certification and a major in the field in which they were teaching, it was concluded that student achievement increases when they have certified teachers as instructors (Darling-Hammond, 2000). Even after controlling for background characteristics in students such as race/ethnicity and socioeconomic status, the major factor contributing to academic success is dependent upon trained and capable teachers. Unfortunately, minority students are commonly placed in science classes with incompetent

teachers (Jencks & Phillips, 1998). When minority students have access to competent teachers the achievement gap between minority and majority students significantly decreases (Columbia Group, 2000). It has been documented in research that quality teachers can make a difference in student achievement. For example, Wright, Horn, and Sanders (1997) (as cited in Stronge and Hindman, 2003) found that students placed with highly effective teachers for three years in a row, beginning in 3rd grade, scored 52 percentile points higher (96th vs. 44th) on Tennessee's state mathematics assessment than did students with comparable achievement histories who had three low-performing teachers in a row.

Even though some changes brought about by NCLB may have a positive impact on student outcomes, the legislation places a burden on local school districts. In addition to the national legislative requirements other factors such as growing student enrollments, smaller class sizes, and teacher retirements are combining to increase the need to recruit and retain more teachers (NCTAF, 2003). These changes, along with the numbers of teachers leaving the profession each year, are making it difficult for school systems to ensure that each child has a licensed professional. Even though there is a nation-wide teacher

shortage, it is not evenly distributed across geographic areas. Furthermore, school administrators are finding it problematic to employ specialized teachers in the areas of math, science, special education, and bilingual education (NCTAF, 2003). In the past, school systems have dealt with these and other openings by decreasing the standards for who can teach rather than increasing incentives for qualified people (Hind, 2002).

This problem of recruiting and retaining content specialized teachers is exacerbated in rural, low-wealth areas. The students in these communities, who tend to be poor and minorities, are also less likely to have access to highly-skilled teachers (Jenks & Phillips, 1998; Berry, Luczak, & Norton, 2002). In addition to the lack of teachers in these localities, there is also a high discrepancy between the demographics of the general population and the demographics of teachers. In the United States, 84% of the teachers are white, 7.6% are African-American, 5.6% are Hispanic, 2% are Asian, and 0.8% fall into the other category (Sweeney, 2002). In North Carolina, 60% of the student population is white, 31% is African-American, 5% is Hispanic, 2% is American Indian while the rest are categorized as other. The demographic population of teachers in North Carolina is 83% white, 15% percent

African-American, and 2% other (NC Department of Public Instruction, 2002). The shortage of teachers, especially African-American teachers is cause for concern. Many African-American students perceive teaching as a career for only Caucasians because very few students have had African-American teachers (King, 1993a). Unfortunately, many African-American students do not have African-American teachers that live in the community in which they live (Gordon, 2000) and do not have contact with these professionals. Students benefit from having teachers from a variety of backgrounds and cultures. Additionally, young African-American students need role models to encourage entry into higher-level jobs, particularly in science and science education (Gursky, 2002).

One way schools might help to decrease the shortage of qualified teachers, specifically African-American science teachers, is to begin recruiting teachers while they are still in middle/junior high school. By the age of 14, most students know what they do **not** want to do (NC Department of Public Instruction, 2002). Students begin thinking about going to college as early as eighth grade (NC Department of Public Instruction, 2002). Since students are making career decisions at such an early age, an effort should be made to encourage students to go into teaching. Steps need to be

taken to find ways to encourage African-American students to enter the teaching profession.

Recruiting African–American Middle School Students

Recruitment for a science career must begin at an early age because according to research literature, students enrolled in advanced or elective science classes are more likely to major in science in college and obtain a science-related job (Farmer, Wardrop, Anderson, & Risinger, 1995). Prerequisites for many of these advanced science classes occur during the middle school years. As a result, if students have not been encouraged to take science classes in middle school, their chances of obtaining a science career diminishes before they even get to high school.

One method used to motivate African-American students in science is to have them participate in science enrichment programs. These programs are designed to provide students with African-American role models currently engaged in science careers. The participants are introduced to scientific concepts in a non-threatening environment and as they do science experiments, they receive encouragement through small group interactions. These enrichment programs are very helpful for African-American students who intend to strive for careers related to science.

East Carolina Reach Up Program

Program Overview

The mission of the East Carolina Reach Up Program was to address issues affecting the science education of African-American students. The program was funded by the Z. Smith Reynolds Foundation and was designed to provide African-American middle school students an opportunity to excel in science. The program activities focused on: (1) developing student self esteem, (2) connecting science to student experiences, and (3) encouraging and motivating students to seek employment where scientific job prospects exist which includes teaching science. The program format included participation in “hands-on” experiments, demonstrations, presentations, test preparations, and discussions with scientists about occupations in science. An emphasis was placed on preparing African-American students for end-of-grade testing in the area of physical science. This study focuses primarily on the third program goal.

Phase one of the program occurred during a two-week period over the summer of 2002. African-American middle school students were brought to a nearby university where they participated in activities related to science and

science careers. The schedule for the summer was as follows:

Summer Daily schedule for participants

8:30 a.m. - 9:00 a.m.	morning snack
9:00 a.m. – 10:00 a.m.	introduction of activity/information session
10:00 a.m. – 10:15 a.m.	break
10:15 a.m. – 11:15 a.m.	implementation of activity/session
11:15 a.m. – 11:30 a.m.	break
11:30 a.m. –12:30 p.m.	making the connection with science and science occupation
12:30 p.m. - 1:00 p.m.	lunch
1:00 p.m. – 2:00 p.m.	science test preparation session and test taking skills
2:00 p.m. – 2:15 p.m.	break
2:00 p.m. - 3:15 p.m.	practice tests
3:15 p.m. – 3:30 p.m.	afternoon snack
3:30 p.m. – 4:30 p.m.	evaluation and assessment of the day

All hands-on activities during the summer session were based on the (GLOBE) program protocols and curriculum.[1] This included taking scientifically valid measurements in the fields of atmosphere, hydrology, soils, and land. All experiments were also supplemented by using university resources and equipment. The students worked in small groups with an undergraduate or graduate student facilitator. Additionally, in hopes to motivate them to consider a science-related career, the participants were given presentations by and allowed to interact with African-American scientists, undergraduate and graduate students majoring in scientific disciplines, African-American medical students, professors, and teachers in science education. The participants collected, analyzed

data, and reported their results to scientists, family, and peers at a culminating poster session at the end of the two-week period during the summer.

Phase two of the program consisted of one-hour tutorial sessions in the subjects of math and science, which were offered to the participants during the 2002-2003 academic school year. The facilitators from the summer also served as tutors for the participants during the academic school year. The two-phase program was designed to increase enrollment and achievement in physical and earth science classes as well as increase interest in science-related careers.

Research Methods

The purpose of this study was to examine African-American middle school students' perceptions about science careers. Student perceptions about a career as a science teacher were examined more closely. The research questions addressed were: (1) What factors affect student perceptions about science? (2) What factors should school systems focus on to attract African-American students to becoming science teachers?

Potential African-American participants were selected from a total population of 4,794 students enrolled in

grades 6-8, of which 50.4% were African-American. The participants represented 13 different schools from one school district in eastern North Carolina. Twenty-four African-American students (13 females and 11 males) participated in the East Carolina Reach Up program. These students were selected to participate in the program based on gender and grade level, the completion of an application, teacher or counselor recommendation, and parent permission. The participants' grade point average was 3.2 on a 4.0 scale. Sixteen of the twenty-four students had enrolled in a general science class and two of the twenty-four students had enrolled in a physical science class. Six students had not enrolled in a science class before the start of the program.

Data Collection

After completing the intensive two weeks of Phase One, all twenty-four students were administered a written survey (See Appendix A) to assess the influence and impact of the summer portion of the program on their perception of science and science-related careers. All twenty-four participants completed the survey consisting of thirteen questions. Ten questions were open-ended, two questions required a yes or no response and one question utilized a Likert scale. In addition to eliciting their perceptions of

science and science-related careers, participants were asked to evaluate strengths and weaknesses of Phase One of the program as well as give suggestions for changes they would make to improve the program. The survey served as a way to gather preliminary information for improving the program and understanding African-American middle school students' perceptions of science and science-related careers.

The survey also provided background information to use in focus group discussions with the participants' peers about pursuing a science-related career such as teaching science. A second group of fifteen ninth grade students who had not participated in the program were interviewed to see if their responses supported the beliefs of the participants of the program (See Appendix B). These students, who had not participated in the program, were orally interviewed at a nearby university in the spring of 2003. The purpose of this focus group was to corroborate the initial findings from the summer program with a group of their peers. Oral responses from the focus group were recorded in writing by the researchers and graduate assistants.

Methodological issues

The respondents in the study were assured that their participation was voluntary; confidentiality was assured. They were told not to use any identifiable details and that the surveys and transcripts would not be analyzed until at least three weeks after the completion of the project. Completion of the survey indicated permission to use the results for the study. Confidentiality was achieved by assigning each student a number and taking all identifiable information off the survey and notes.

Data analysis

Qualitative data analysis was utilized. Quantitative methods were used for the yes/no questions as well as the questions utilizing the Likert scale. For these questions, descriptive data analysis was used and the frequencies for each are described in the results section. The researchers then used this data for interviews with the nonparticipating middle school students. These non-participants served as a focus group. The information gathered from the focus group of students was used as a supplemental source of data to the survey (Morgan, 1997). The researchers were trying to confirm the perceptions about teaching science and interests in other science-related careers with those of their peers.

Qualitative data analysis is the “systematic examination of something to determine its parts, the relationship among the parts, and their relationship to the whole” (Spradley, 1980, p. 85). Data analysis is the search for patterns among categories that are identified by the researcher through direct examination of the data. Spradley’s (1980) developmental research sequence was used to guide data analysis of the open-ended questions. Within this sequence, cultural domains are created which are categories of cultural meaning that include smaller categories.

After the completion of the project, both researchers independently examined surveys and interview notes to determine cultural domains or themes within the responses for each question. The researchers created a list of cultural domains or themes from this initial analysis. The next step in analysis consisted of identifying the relationships and patterns between the cultural domains. Identifying the relationships between the terms in a domain served as a double check of the domain names. Third, taxonomy was created by listing the terms under the domain names and identifying the relationships within and across other domains (Spradley, 1980). The taxonomy helped to organize the data and served as an outline in presenting

the information to the reader (See Appendix C). The major cultural domains or themes that emerged included: perceptions of science, school, and teaching.

Trustworthiness

In qualitative research, the researcher is responsible for making sure that the results and findings create an accurate picture of the participants and the participants' words. As with any form of research, qualitative researchers are responsible for producing valid and reliable knowledge (Merriam, 1998). In some qualitative research, this attempt is referred to as establishing trustworthiness (Lincoln & Guba, 1985). Attempts to establish trustworthiness were accomplished through the use of two techniques suggested by Lincoln and Guba (1985): credibility and transferability.

Credibility. Credibility was established through the use of two different techniques: triangulation and peer debriefing. Triangulation is a process in which the researcher uses different data sources to gain information on the same phenomenon (Lincoln & Guba, 1985). In this study, data were compared across two different data sources, the survey given to the project group and the group interviews of participants who did not participate in the project. Examining data from these different groups

allows us to ensure that the responses that we received about science teaching from one group are transferable to other groups.

Lincoln and Guba (1985) define peer debriefing as a meeting in which peers discuss the study in an analytical manner with the researcher. The researchers invited a peer to participate in a debriefing meeting. The discussions that ensued were helpful because they brought points of view or questions to the forefront that may have otherwise gone unexamined. During the discussions, formerly undisclosed biases were probed. For example, we discovered that both researchers favored teaching science over other potential science careers. The discussions validated the themes and the peer debriefer encouraged the researchers to consider adding perceptions of a science career as an additional theme. The researchers went back to the data and searched for science career information. While there is information about several science careers, the researchers decided to focus more on the science-related career of teaching science.

Transferability. Transferability is achieved in qualitative research when the researchers provide a rich enough description of the data, the participants, and the methods that the reader can decide for him/herself if the

findings are applicable to his/her particular situation (Lincoln & Guba, 1985). An effort was made throughout the study to describe the participants, methods, and data in such a way that readers could make their own decisions as to whether the results applied to their particular situation.

Results

Students' Responses to Written Survey

In response to the Question 6: "**Has participation in this program increased your confidence in your ability to take more advanced science courses? Why or Why not?"** Nineteen of the students (79%) agreed that participation in the program increased their confidence to take more advanced science courses. Respondents agreed that participation in the program increased their knowledge about the subject and that they felt they had an academic advantage over other students. With respect to self-esteem, the respondents felt more confident after participating in the program. One student wrote:

> Participating in this program has increased my confidence in my ability to take more advanced science courses. I believe that I can do things far above what I (use to) believe I could do.

Students responding “no” to the question indicated that they really didn’t like science or were not interested in a science-related career.

Question 7 asked the students: **Has participating in this program changed the way you feel about a science-related career? Why or Why not?**

Eighteen (75%) out of the twenty-four students agreed that participation in the program changed the way they felt about pursuing a science-related career. Student responses were related to having fun or perceptions of enjoyment. They indicated that they would consider specific scientific occupations such as teaching science as a result of participation in the program. Two students made statements such as “I now want to become a doctor” and “Maybe I will become a chemist”. The students noted that they gained a better respect for science and realized the relevance of science to their everyday lives. It is interesting to note that five of the participants reported that participation in the program did not change the way they felt about a science-related career. These five students already enjoyed science or were already interested in pursuing a science-related profession prior to the start of the program.

Further data on middle school student interests in becoming a science teacher was gathered using three different questions. First the students were given a Likert scale and asked to rate their interest in the following science careers: computer science, medicine, engineering, science teacher, pharmacy, or nursing. These students (N =24) were mostly interested in computer science and medical careers (See Table 1).

Table 1

Career Interests

Career Choice	**Highly Interested**
Computer Science	8
Medicine	8
Engineering	3
Science Teacher	3
Pharmacy	1
Nursing	1

Only a few were highly interested in engineering, teaching science, pharmacy, or nursing. Thirteen of the participants indicated that a member of their family was currently employed as a computer/technician, engineer,

medical doctor, nurse, pharmacist, science teacher, or in another science-related occupation. However, only five agreed that their parent's profession in science influenced their interest in the subject.

To find out more about middle school students' interests in becoming a science teacher, Question 11 asked: "**Have you ever considered becoming a science teacher**? **Why or why not?"** Even though three students (13%) indicated that they were highly interested in becoming a science teacher only one student indicated a slight interest in an open-ended question by responding, "Maybe when I get older". One other student did indicate an interest in becoming a reading teacher.

When answering why they were not interested in becoming science teachers, their responses were related to one of four of the following statements:

I don't like science that much (5)[2]

I really don't want to be any kind of teacher (4)

It's too hard (3)

I really don't understand some things about science(3)

Question 12 asked: "**Is teaching considered a popular profession among middle school students? Why or why not?"** Only four (17%) of the twenty-four students responded yes to this question. In responding to the why or why not

portion of the question, most students put only one reason while others put several. The reasons they gave included the opportunity to work with kids (2), to give back to the community (1), and playing school when young (1).

Twenty-one of the students responded that teaching is not a popular profession among middle school students. When stating why they did not want to become a teacher, ten of their responses had to do with negative aspects of school. The number one reason was that they did not like going to school and did not want to work in a school (5). Other reasons were that school was boring (1), they had to listen to teachers (1), bad kids (1), and same situation in every school (1). Three of the students mentioned the low teacher salary. Other responses included wanting to be something else (3).

The final question asked about becoming a science teacher was: **What challenges may keep you from obtaining your goal of becoming a science teacher?** Eight of the students responded that they were not interested in becoming a science teacher. Six of the students stated that they had no challenges. Challenges mentioned by the students included concern about the courses they needed to take (5), their own ability (2), comments from peers (1), salary (1), lack of money (1), and other interests (3).

Focus Group

Of the fifteen students interviewed most of them were not very interested in a science-related career. One of these students indicated interests in computer science and another wanted to become a nurse. When asked if any one of them had considered teaching science all of them shook their head. None of them were interested in teaching science. When probed further, these students responded that teachers were too strict and students were bad. One student said:

> *What ya'll have to go through… Can I say it? Can I say it? (the interviewer nodded) Ya'll have to go through hell.*

Every student in the group laughed at this response.

Conclusion

A holistic view of the responses to the open-ended questions revealed three main themes: perceptions of science, school, and science teaching. These themes relate closely to the questions asked to the students on the survey. Middle school students have not seriously considered becoming science teachers. These students revealed that teaching science is unpopular among middle school students for both direct and indirect reasons. Directly, the salary of a teacher was too low to justify putting up with students that misbehave in the classroom.

Indirectly, some did not want to become a science teacher because they just didn't like it. These students reported a pessimistic view about teaching science.

Most of the students in the program had negative perceptions of science. They commented on the difficult nature of the subject by stating that science classes were too hard, difficult, and not fun. A student reported that "I usually don't have fun doing science but this was fun." They realized that it could be fun and participation in the program changed the way they felt about doing science-related activities.

They also wrote that after participating in the program that they learned more about science. These students felt that they had increased their knowledge, had an advantage over other students, and learned more while doing hands-on activities. Many commented on increased confidence in their ability to do science, even enroll in advanced science classes and would now consider a career in the field.

After participating in the East Carolina Reach Up program, most of the students' views were positive about the subject. For example, student responses included: "Doing the investigations helped me see how science is important and I know how to figure out if water is

drinkable.” Several students commented on the fact that they could see the relevance of science in their daily lives and began to care about it.

Unfortunately, even after attending the two-week session of the program, student participants’ views about school were negative. They stated that school was boring, the teachers were mean/strict, the kids were mean, and they did not like school. These views paralleled the responses of the focus group of students who had not participated in the program. Along with the negative perceptions of school, were the students’ depressing views about teaching science. Even after participating in the East Carolina Reach Up program, most of the students that participated in the program stated that they were not interested in becoming science teachers. Throughout the responses on the survey, they mentioned several reasons, including having to take more science classes, not liking kids, dealing with bad kids, and receiving a low salary. Several also mentioned their dislike for school and not wanting to work in that environment. The students in the focus group made similar responses to those students who participated in the East Carolina Reach Up program, however, none of the students in the focus group were interested in a career as a science teacher.

Limitations of Study

Although this study is limited by the number of students that participated in the written survey and oral interview, this case study did provide valuable insights about African-American middle school students' perceptions about science-related careers. This in-depth analysis of the East Carolina Reach Up program presented information that can be applied to a larger population and geographic area. While the research of King (1993b) provided possible reasons for why there are so few African-American teachers by interviewing a small cohort of African-Americans in the teaching profession, the results from this investigation can further explain why there is a lack of African-American science teachers from a student prospective.

Recommendations and Discussion

Participation in the East Carolina Reach Up Program had an impact on student perceptions of science and their science ability. Developing a positive perception of science is the first step in recruiting middle school students into science careers and, potentially, into science teaching. The increased confidence that students experienced after participating in the program is an important finding because students with high self-esteem and confidence are more likely to enroll in advanced

science courses, major in a scientific discipline and pursue a science-related job (Farmer, Wardrop, Anderson, & Risinger, 1995). Additionally, most of the participants stated that they thought more positively about a science-related career.

A somewhat surprising finding was the way the students' low regard for school carried over into their perceptions of teaching as a career. At the time of this study, only one student wanted to become a science teacher. This finding is supported in the literature which states that by the time students reach the ninth grade they know what they do **not** want to do (NC DPI, 2002). The students who participated in the program were not able to see the job of teaching from a teacher's perspective, just from their own. They focused on the strict teachers, the boring days, and the bad students. These students did not mention the intrinsic rewards cited most frequently by teachers entering the profession (Goodlad, 1984). Their negative focus on the teacher salary is probably related to their parents and/or society's view rather than a realistic understanding of the salary and monthly expenses. Regrettably, programs like the East Carolina Reach Up program may do little if anything to change middle school students' perception about teaching.

The program helps to offset several of the factors students identified as reasons not to become science teachers. It is important to change students' perceptions of science and teaching early in their educational careers. Students need to feel confident in their science ability and enjoy doing science. Additionally, they should have a better understanding of teaching and the role of a teacher. Catching students early may encourage more students to enter the scientific job market and consider teaching science.

School systems should consider science enrichment programs to improve student perceptions of science and to introduce students to individuals who look like them currently participating in a science-related career. More specifically, African-American students should participate in programs such as the East Carolina Reach Up program or enrichment programs, clubs, programs or organizations that specifically focus on attracting students to a science-related career in which they may gain an increased understanding of science concepts, and confidence in their ability to take advanced science courses. Guidance counselors should then encourage this minority group of students to major in science and consider science-related careers. Getting students involved in a science enrichment

program is an important first step in getting students interested in science-related careers.

To critically address the immediate need for science teachers, positive aspects of teaching need to be revisited. The goal of science education is to create scientifically literate individuals that can function in a contemporary technological society and ultimately prepare more students for science-related careers. Of course, more students would consider teaching science as a science-related career if teachers were paid more and had fewer discipline problems in the classroom. Our society has to re-establish the prestige of teaching within the community by hiring qualified people in science education. This can be accomplished with legislative support to mandate higher teacher salaries because teachers have been paid less than any other occupation requiring a college degree (Hind, 2002). Teacher assistance is needed to create optimum learning environments for all students to academically achieve.

Students need to have some input concerning classroom management and their input about discipline welcomed by the teacher. They learn best in an inviting atmosphere where the teacher recognizes their opinion and feelings (Kauffman, 1998). Most importantly, students need to have

fun while learning about subjects in school such as science if they are to be inspired to pursue a career in which currently a love for the job itself has to mean more than monetary gains. Classroom teachers have to encourage academic achievers to not just pursue the high paying jobs, but also an important career in teaching (Gomez, 2002).

School systems desperately need highly skilled science teachers. More United States citizens will have to be recruited and trained in science, particularly in the field of science education. The percentage of African-Americans employed in the teaching profession is disproportionate to the percentage of African-American students in school (Gomez, 2002). One solution to this growing concern is to expose more African-Americans at a young age to role models with scientific occupations. Steps also need to be taken to increase their confidence in their ability to take more advanced science courses, to enhance their appreciation and understanding the relevance of the subject, and extend their awareness of the various science-related career options, which includes teaching science. According to nearly half of the student participants, the strengths of the East Carolina Reach Up program were the experiments/investigations, culminating presentations, and group leaders. Therefore, it is recommended that enrichment

programs for African-American students are staffed with competent individuals to serve as facilitators and counselors, incorporate interesting science-related activities, and allow the participants to share what they learned through written and oral discussions. Enrichment programs can be a vehicle for students to work with qualified African-American teachers, scientists, and health professionals in the community in hopes to inspire them to want to pursue a career in science education.

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Footnotes

[1] Information about GLOBE can be obtained from http://www.globe.gov/globe.

[2] Number in parenthesis indicates how many students made similar responses.

Appendix A

1. What did you like most about the program?

2. What did you like least about the program?

3. What would change about the program?

4. Has participation in this program changed the way you feel about doing science-related activities? Why or why not?

5. Has participating in this program increased your understanding on how science relates to your everyday life? Why or why not?

6. Has participating in this program increased your confidence in your ability to take more advanced science courses? Why or why not?

7. Has participating in this program changed the way you feel about a science-related career? Why or why not?

8. Rank the following professions in order of career interest:

	Highly Interested	**Intereste d**	**Somewhat Interested**	**Not Interested**
Computer/ technology	4	3	2	1
Engineering	4	3	2	1
Medical doctor	4	3	2	1
Nurse	4	3	2	1
Pharmacist	4	3	2	1
Science teacher	4	3	2	1
Other _____	4	3	2	1

9. Does anyone in your family currently work in the previously mentioned careers? yes no

10. If so, did having a family member in a science career affect your interest in science? yes no

11. Have you ever considered becoming a science teacher? Why or why not?

12. Is teaching considered a popular profession among middle school students? Why or why not?

13. What challenges may keep you from obtaining your goal of becoming a science teacher?

Appendix B

Questions 1. Are any of you interested in a science-related career?

Questions 2. Have any of you considered teaching science? Why or Why Not?

Appendix C

Taxonomy

I. Perceptions of Science
   - A. Negative
     - i. Difficult/hard
     - ii. Did not like
   - B. Positive
     - i. Program participation changed perceptions
     - ii. Increased knowledge- advantage
     - iii. Increased confidence
     - iv. See relevance of science in daily life
     - v. Increased interest in science careers

II. Perceptions of School
   - A. Boring
   - B. Mean/strict teachers
   - C. Mean kids
   - D. Did not like school

III. Perceptions of Teaching
   - A. Take more science classes
   - B. Not liking kids
   - C. Dealing with bad kids
   - D. Low salary
   - E. Not like school, don’t want to work in one