4. Student Findings

4.1 Description of Student Respondents

Survey respondents were fairly evenly divided by gender. On average they were 16.5 years of age when they attended, and most were going into their junior or senior years in high school. The majority of respondents (88%) were white and 11% were minority. (See Table 4.) These proportions mirror the diversity in the region.[19] Thirty-one percent attended schools in counties designated by the ARC as "distressed." (See Table 2.); and 47% of respondents were from three states—Georgia, New York, and Ohio. (See appendix Table A1.) While quite a few of them (27%) had attended other STEM programs outside of school, most (73%) had not.

In general, student respondents lived in households with adults who had some college education (see Table 5). Almost three-quarters of the students (73%) reported that their mothers, or another female adult with whom they lived during high school, had some college education or more. Similarly, 60% of students lived with a father, or other male adult, who had at least some college education.

Approximately half the students (46; 53%) lived in households where one or both adults/caregivers had earned a bachelor's or graduate degree; 15% of students (13) lived in households where both the mothers and fathers had a high school diploma or GED or less.

4.2 Overall Assessment of the Summer Institute

Overall, student participants were enthusiastic about the Summer Institute, and fully 90% reported that they recommended the Summer Institute to other students once they returned home. "Motivating," "refreshing," and "liberating," were words used to describe their two-weeks at ORNL.

Survey responses and interviews revealed that participants benefited from the program in significant ways. They became more self-confident and approached their high school studies with renewed interest. Their aspirations for college were reinforced, and many pursued STEM majors in their post-high school studies. For once, one student reported, "I wasn't penalized for being smart." In short, students expressed a collective sigh of relief in a comfortable environment.

A large majority of students reported that they were challenged by the activities in which they participated: 29% reported activities at the Summer Institute as "very challenging" and 61% said they were "somewhat challenging;" 3% said they were overwhelmed by the activities and felt unprepared; and, 7% found the activities to be "not at all challenging."

[19] According to the U.S. Census for 2000 figures, the population was 88% white, 8% black, 2% Hispanic and 2% other. Kelvin Pollard (2004). *A "New Diversity": Race and Ethnicity in the Appalachian Region.* Washington DC: Population Reference Bureau.

Table 4—Selected characteristics of student survey respondents		
Mean age in years	16.5	
	N	%
Gender		
Male	46	52%
Female	43	48%
Highest grade in school completed prior to attending the Summer Institute*		
9th	2	2%
10th	34	38%
11th	51	57%
12th or above**	2	2%
Ethnicity***		
White	78	88%
Black or African American	6	7%
Hispanic or Latino	0	0%
Asian or Pacific Islander	3	3%
American Indian or Alaska Native	1	1%

* Does not total to 100% due to rounding.

**One respondent completed a community college course.

***Multiple answers were allowed. Only one respondent identified as more than one ethnicity (White and African American).

Table 5—Parents' highest level of formal education	Mother		Father	
	N	%	N	%
Less than high school graduate	2	2%	8	9%
High school or GED	17	19%	17	19%
Post high school trade school	4	5%	9	10%
Some college	19	21%	11	12%
Associates degree	12	13%	8	9%
Bachelor's degree	19	21%	21	24%
Graduate degree	16	18%	13	15%

The next sections of this report outline the influence of the Summer Institutes on students when they returned to school, and with regard to college-going and to considering and pursuing STEM careers. The quotes from students scattered throughout this section illuminate the aspects of the Summer Institute that students found most influential with regard to these outcomes.

4.3 Influence of Peer Support

According to a report on strategies to increase postsecondary access for underrepresented youth by the National Postsecondary Education Cooperative, one of the most effective program practices is "providing a peer group that supports students' academic aspirations as well as giving them social and emotional support."[20] It is therefore not surprising that one of the major findings of this evaluation is that, for students, the most important and influential feature of the Summer Institute was their interactions with other students. These interactions also made their time at the institute enjoyable. The value of peer-to-peer learning and support echoed through responses to multiple questions on the survey and in the interviews. For example, one student said:

> *The interesting things you learn about science were all very fascinating, but for me, I will always remember the people I met. When you live for two weeks with other people, you learn a lot.*

Students also deeply valued the social experience of the institute. This was the first time many students had ventured outside their hometowns, traveled alone, and stayed with people they didn't know. Students' comments revealed that they felt challenged, learned more about themselves, and discovered that there were more opportunities and possibilities for further education and jobs than they had realized. Some characterized their two-weeks as an "eye-opening" experience:

> *The friendship and social enrichment that I received by interacting with the other students at the Summer Institute was priceless. It was very valuable to me to reach outside my home area, my friend group that I had known since childhood, to see what new people from different backgrounds had to say and teach me.*

In the course of student interviews, many students expressed satisfaction and relief when they realized they were not "the only one" their age with interests in science or plans to pursue their education. They were relieved and pleased to discover that outside their circle of acquaintances there were students who had similar interests and goals.

> *It made me realize that others my age truly cared about their futures and a global world rather than just the valleys they, and myself, grew up in. It made me feel like I didn't stick out . . . I fit in for a change.*

> *The students I met were terrific. What stood out about them was their high goals and expectations to succeed. I felt that I could relate with them, that I was one of them, and that all of us would be successful in education and in our careers. This confidence continued with me during high school and college.*

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[20] U.S. Department of Education, National Center for Education Statistics. *Paving the Way to Postsecondary Education: K-12 Intervention Programs for Underrepresented Youth,* NCES 2001-205, prepared by Patricia Gándara with the assistance of Deborah Bial for the National Postsecondary Cooperative Access Working Group. Washington DC: 2001.

When asked to describe the people at the institute who were influential, respondents mentioned students more frequently than teachers, and almost as often as mentors. While participants gained a great deal from seeing mentors and teachers in action, exposure to the decisions and goals of their peers had a profound impact.

> *There was another student there . . .with big dreams about a degree at WVU* [West Virginia University] . . . [she] *had a very positive attitude and made me feel more comfortable.*
>
> *Many of the students made me realize how many different opportunities there were and how much I still had to discover outside of the small town that I grew up in. They all gave me confidence and excitement about my future—to leave the familiar for the unknown!*

4.4 Influence of Mentors, Chaperones, and Teachers

Students also highly valued their relationships with mentors, chaperones and teachers. In fact, 46% of survey respondents answered "yes" in response to a question on the survey that asked: "Was there a particular person, or experience/activity that had an impact on your academic or professional development?" Approximately half of them mentioned someone from the institute (teacher, student, mentor, or chaperone). Responses indicated that the person influenced their career choice, increased their enthusiasm for scholarship and learning, and increased their level of self-confidence. While students did not always articulate what it was about these people that inspired their academic and professional development, many noted that the person(s) provided advice and/or encouragement.

> *There were several people who had an influence on me after the institute; however, one in particular stands out in my mind. He was a teacher, and I have remained in contact with him ever since the institute. He frequently speaks with me about what I am doing with my life. He gives me advice and encouragement as well. He has seriously been a huge aspect as to why I aspire to go into the medical field.*

One student expressed the importance of the people she met on her future plans:

> *The greatest highlight of all was meeting so many new people. Not only did I make friends that I still remain in contact with, but I also met many professors/mentors/chaperones that could give me great insight as to what it takes to be successful in a science career.*

4.5 Changes in Attitudes about School and Subjects Studied

Students reported that the Summer Institute had a reinvigorating effect on their attitudes and behaviors when they returned to high school that fostered their desire for academic success. A total of 57% of them answered "yes" to the question, "Did the Summer Institute have an effect on you when you returned to school, for example, grades and attendance; attitude toward school, teacher or courses; or involvement in math or science clubs or activities?"

Over half of these respondents stated that the experience increased their enthusiasm, drive, motivation, effort, involvement, and attitude toward school. Slightly less than half of respondents stated that they were more enthusiastic and interested in STEM subject areas. The following quotes are illustrative:

I cared more. Bottom line. I never would admit that or show it then, but for the rest of high school, I actually didn't sleep through class. I read non-fiction books to learn from outside the curriculum for the first time in 16 years. The following school year, I actually spent hours trying to solve geometry problems from a teachers' master's course book.

The Summer Institute gave me a different outlook on life. It made me even more excited to learn and go to college and meet new people. It helped me to experience the world at such a young age which in turn helped prepare me for college and independence.

I was always active in high school, but after I returned from the Summer Institute, I was so much more enthusiastic about it all, including school in general. I spent my senior year being very active with a teacher at my school, who also attended the institute, in many clubs such as the science club. Also, I buckled down on my studies and graduated valedictorian of my class.

The Summer Institute definitely had an effect on the way I acted around other students and teachers. It reassured me that I can speak my mind and people will listen to what I have to say. The Summer Institute didn't give me a voice, but it helped me find mine.

We asked students whether their experience at the Summer Institute influenced the science courses they took when they returned to school. Almost a quarter of the students (24%) reported that they took more science classes when they returned to high school. More than half (56%) indicated that the institute reinforced their prior decisions about the science courses they were scheduled to take and 20% said the institute had no influence. Of the 21 students who reported taking more science classes, six took an advanced or honors-level course, and approximately half (12) took two or more science classes. Students took science classes in a variety of disciplines—chemistry (13 students), physics (10), biology (7), anatomy and physiology (3), and physical science (1), environment (1), nutrition (1), and computer science (1).

Fewer students, 22% reported taking more math classes as a result of attending the institute; 52% reported that the institute reinforced prior decisions, and 26% said that the institute made no difference on the courses they took. Of the 19 students who said they took more math classes, four took advanced placement-level courses. The number of students taking various math course were as follows—pre-calculus (9), calculus (12), algebra I and/or II (4), trigonometry (3), geometry (2), and statistics (3).

Teachers also noticed that students profited from the institute in terms of their attitudes and behaviors. Of the 34 teachers who commented about changes they noticed in students either during the institute or when students returned to school, the highest percentage (29%) mentioned students' increased interpersonal or social skills, noting that they seemed more "personable," "self-confident," "proud," and "outgoing." A quarter of the teachers mentioned that, as a result of the institute, students were more dedicated to their studies and more serious about their future and motivated. The following quote illustrates the changes noted by teachers:

It seems that all five students from my school returned with a much more mature outlook on life and their future goals. I think the experiences in the workplace, the visits to different schools/businesses and the relationships with students different from them were really beneficial.

A quarter of the interviewed teachers also noted that students gained a deeper knowledge of the subject area they studied and a greater interest in math and science:

> *I think both students gained a greater appreciation for science. They have both gone on to major in some aspect of science.*

4.6 Pursuit of STEM Education and Employment

Findings displayed in Table 6, show that students reported that participating in the Summer Institute greatly influenced their views of STEM. More than two-thirds of students gave the two highest ratings to statements reflecting increased awareness of and improved attitudes toward STEM. Fully 88% reported that the institute positively increased their awareness of ways STEM can be applied. They strongly agreed with statements on the survey that said the Summer Institute had increased their interest in STEM and increased their confidence in their abilities in these fields. A small number of students (14) reported that the Summer Institute increased their interest in a field outside of STEM; however, when we asked them to specify these other fields, they named occupations that were in the sciences or computer fields, such as medicine, pharmacy, nursing, and computer software design and Web design.

Males and females held fairly similar opinions about the influence of the Summer Institute on them. However, females were significantly more likely than males to indicate that the program increased their awareness of job opportunities in STEM (p=0.63).[21]

Table 6—Students' ratings of the extent to which the Summer Institute influenced awareness, confidence and interest in STEM

	Percentage Distribution				
	Great extent				**Not at all**
	5	**4**	**3**	**2**	**1**
Increased their awareness of ways STEM can be applied.	48	40	9	1	2
Increased their interest in STEM.	34	35	24	5	2
Increased their confidence in their ability in STEM.	27	47	19	5	2
Increased their awareness of job opportunities in STEM.	33	40	16	7	5
Increased their interest in a career in STEM.	33	34	20	7	6
Increased their interest in another career or field.	9	9	23	13	45

Notes:
Students rated statements on a 5-point scale where the endpoints only were labeled.
Percentages in this table may not total 100% due to rounding.

[21] Two tailed t-tests were conducted to determine the significance of means. Because of the small respondent pool (n=88), a relaxed standard for significance was used ($p \leq 0.10$).

In addition, some students commented that the institute broadened their choices in the careers they were considering after high school. For example:

> *Growing up in a small town, many students marry and go into labor jobs immediately after high school. Meeting with students from around the Appalachian region, who all had interest in furthering their education challenged me to look past the typical career choices in my area. I wanted to challenge myself to do more, and now, that is exactly what I am doing.*

Many of the students' responses related to the project they worked on and their experience working in that topic area. Students enjoyed the "real world" research and recognized its applicability outside the laboratory setting. In addition, students commented on the value of gaining hands-on experience, and many cited their specific project assignment as the highlight of their stay at ORNL. One student commented on how a project directly influenced her career choice:

> *The field components of our study–collecting snails, fish, water quality and stream data–were my favorite part of the Summer Institute. Thanks to the time I spent with Mike and Art, I became certain that biology, with a strong field component, was the path that I wanted to pursue.*

Another prevalent theme of students' comments was the experience of working in the ORNL facility and touring the labs. Students enjoyed learning more about science, technology, engineering, and mathematics. Some students felt privileged to have access to equipment that "not just anyone" could use:

> *Scanning electron microscopes are multi-million dollar pieces of equipment, so, as a student, I was shocked by the amount of trust our supervisors at ORNL gave us when allowing us their SEM. That experience was the highlight of my trip there. I could have spent hours in that room studying specimens beneath the microscope.*

The specific project that the students were assigned to was a key determining factor in the lessons they took away from the Summer Institute. For example, one student selected a project that involved fieldwork and she enjoyed it so much that it confirmed her desire to be a biologist and conduct field work; this student is now leading outdoor tours at her university and will graduate in May 2006 with a degree in biology. Not being assigned to a chosen project caused some disgruntlement. One student said that he did not find his experience very influential on his thinking because he was not assigned the project he requested. Another expressed relief that she was on the project she desired and knew she would have been unhappy if she had not been on this project. The students reported different processes for selecting the projects that they could work on. Some remember ranking their choices whereas another, from 2001, said students in his cohort were assigned to projects without making any selections. Students who were interviewed felt that overall the selection process should be more tailored to the students' interests.

4.7 College Aspirations and Planning

Preparation for College

In general, in order to attend college, students and their families must mount a complex series of steps, beginning with identifying college as a goal. This usually starts with recognizing the importance of higher education for future careers, followed by taking and doing well in the requisite courses, selecting and applying to one or more colleges, and applying for financial assistance.

Ohio's *Appalachian Research and Success Project* identified several significant barriers to college-access in Appalachian Ohio. These included lack of information or misinformation among students. Other barriers were lack of guidance, assistance, academic preparation, and encouragement to help overcome low self-esteem. The research also found that students and their families lacked information about financial opportunities and the process for applying for aid.[22]

As has been found in other surveys administered in school settings, the current evaluation revealed that all of the student survey respondents reported that, even prior to attending the Summer Institute, they planned to attend college. Even so, students reported many ways that the Summer Institute reinforced their intentions to go to college and reduced some of the barriers. For example, more than 50% of Summer Institute students indicated that the program positively influenced their intentions to go to college. As shown in Table 7, they rated highly (i.e., a rating of 4 or 5) the contributions of meeting other college-bound students, as well as the high expectation on the part of mentors, chaperones, and other staff. Information about financial aid was seen as helpful by 37% of students, but, on average, played a lesser role in influencing their thinking about college. Because we had no way to measure students' families' economic status, we cannot ascertain whether this information might have been crucial for students from economically disadvantaged households. What we do know from interviews is that several students complained that their guidance counselors had not provided sufficient information about college-going.

Interviewed students described how the ORNL experience reinforced their decisions to attend college and helped guide them in a general direction of study. They reported feeling encouraged and inspired to pursue higher education. For example, one student reported that he was certain he was going to go to college "no matter what," but his experience at the Summer Institute helped him decide to go into mechanical engineering. Another student who was considering pharmacy training was assigned to a project that actually dealt with pharmaceuticals. This confirmed her decision and she is now a practicing pharmacist after recently completing her schooling and residency.

[22] Crowther T., Lykins D., and Spohn K., (1992). *Report of the Appalachian Access and Success Project to the Ohio Board of Regents*. Athens/Portsmouth: Institute for Local Government Administration and Rural Development, Ohio University/Shawnee State University.

Table 7—Students' ratings of the extent to which various aspects of the Summer Institute positively influenced their thinking about going to college.

	Percentage Distribution				
	Great extent				**Not at all**
	5	**4**	**3**	**2**	**1**
Meeting other students with college plans	44	27	17	6	6
High expectations of mentors and other staff	32	40	18	3	7
Interaction with mentors	33	36	17	7	7
Interaction with other staff at ORNL	26	38	22	6	8
Learning about educational requirements for careers in science	27	35	22	7	9
Interactions with chaperones	24	29	28	7	11
Trips to local colleges	27	23	23	16	11
Information about financial aid	15	22	25	17	21

Notes:

Students rated statements on a 5-point scale where the endpoints only were labeled.

Percentages in this table may not total 100% due to rounding.

As already mentioned, many students found it especially beneficial to hear about other students' college plans. Another student who described the ORNL experience as a "big confidence-builder," said it pushed him to look to the future and consider schools that were a bit farther away from home. One student appreciated that the institute gave him a taste of college life. Several students reported that the institute positively influenced their thinking about college. One stated that the institute was extremely influential and helped her clarify what she "wanted to do for the rest of her life."

The evaluation explored steps students had taken to achieve their college goals. We found that although all planned to continue their education, approximately half the students (51%) had never toured a college campus before the institute. It is not surprising, then, that 50% of students reported that visiting the college campuses as part of the Summer Institute positively influenced their thinking about going to college. Further, when it came to applying to college, 85% of students who applied mentioned their experience at ORNL either in essays or interviews.

While most of the college-going process is out of the control of the Summer Institute, the evaluation asked students questions about other supports students needed to translate a desire to go to college into a reality. These findings have implications for the advisability of building school connections that ARC–ORNL might want to consider. It appears from student responses that schools could improve in terms of helping students apply, and gain admission to, college. Although 64% of students thought that their school gave them sufficient information regarding college choices, 32% said schools had not, and 4% were unsure. According to students, schools were less helpful providing what students considered sufficient information about college costs and financial aid. Half of students (50%) reported that their school provided enough information, 40% said schools did not, and 10% were unsure.

Table 8 shows that students consider parents and teachers as providing the most encouragement for their college plans.

Table 8—Mean scores for students' ratings of the extent to which they received encouragement to attend college from the following:	
Parents or guardians	4.73
Teachers	4.56
Siblings or friends	3.95
Guidance counselor	3.92
Community or religious organizations	3.14
Note: Students rated each on a 5-point scale where 1= Not at all and 5= To a great extent.	

4.8 College Enrollment

Fully 96% of student participants who had graduated from high school said that they continued their formal education. Of the 83 respondents who provided data:

- a great majority (79%) went to four-year institutions.
- fifteen percent went to community colleges or technical centers.
- two percent to military academies.
- three percent did not continue their education beyond high school.[23]

By comparison, these rates are much higher than rates for the U.S. population overall, where enrollment in four-year institutions is 37% for the white population, 26% for the black population, and 15% for the Hispanic population.[24] (As shown in Table 4, Summer Institute student-survey respondents were 88% white and 12% minority.) Among our participants, boys were more likely than girls to stop at high school and go to community colleges or technical centers. Girls were significantly more likely than boys to go on to four-year colleges (p=0.51). (See appendix Table A4.)

Because many student participants were still pursuing their educations, it is not possible to determine how many of them will ultimately complete their degrees and at what level. Table 9 shows their educational attainment at the time of the survey. Appendix Table A5 displays findings on the highest education that students had completed to date by cohort. As would be expected the earliest cohorts have achieved the most college and graduate degrees and the later cohorts appear to be in the process of completing their undergraduate degrees.

[23] Two participants still in high school were excluded from the analysis.

[24] Forster, Greg (2006). Opinion. The Embarrassing Good News on College Access. *The Chronicle of Higher Education.* http://chronicle.com/free/v52/i27/27b05001.htm (accessed March 2006).

Table 9—Students' highest educational attainment	N	%
Some high school or high school graduate	18	20%
One or more years of college but no degree	32	36%
Associate's degree, certificate or technical diploma	7	8%
Bachelor's degree	19	21%
Some graduate work or advanced degree	12	14%

Note: Percentages in this table do not total 100% due to rounding.

Considering only the 23 students in the two earliest cohorts—i.e. those out of high school long enough to have obtained a college degree—all reported having some higher education, with 26% having some college but no degree, 39% earning a bachelor's degree, and 35% going on to graduate work.

All students from households with at least one parent with a college degree continued their formal education after high school. Of the nine students who lived in families where both adults had no more than a high school education, seven (78%) continued their formal education after high school. At the time of the survey, the highest level of education attained to date, for two was an associate's and for five a bachelor's degree. One student who did not go to college entered the military service.

We estimate that approximately two thirds of students pursued STEM majors in college. Findings in Table 10 show the majors reported in the survey. Unfortunately, the survey did not ask students to name their first declared major at the postsecondary level. Rather, it asked students to list all of the educational institutions they were attending/had attended and their majors. Those who graduated gave the major for which they had fulfilled requirements. Those who were early in their undergraduate education gave current majors, which could change. Therefore, the data should be interpreted with caution.

Table 10—Major fields of study	N	%
STEM		
Biological sciences	20	28%
Engineering	10	14%
Computer & technology	6	8%
Mathematics	3	4%
Environment or ecology	3	4%
Chemistry	2	3%
Non-STEM		
Social Science	10	14%
Other	18	25%

Looking more closely at degrees earned from higher education institutions, we learned that 36 students had earned a total of 46 degrees: 54% of degrees earned were in STEM—38% of associate's degrees, 52% of bachelor's, and 86% of graduate degrees. (See Table 11.)

By comparison, 82% of students currently pursuing degrees at the time of the survey were majoring in STEM fields. Table 11 below also shows the distribution of STEM and other degrees attained at the associate's, bachelor's, and graduate levels.[25]

- Thirty-four students were pursuing four-year degrees, and of the 32 that indicated their field of study, 27 were majoring in STEM subjects.
- Of the six students attending a community college or technical center, five were pursuing STEM subjects.
- Of 10 students pursuing graduate degrees, six provided information about their field of study. Four of the six were in STEM fields.

Table 11—Degrees pursued or earned in STEM and other fields of study

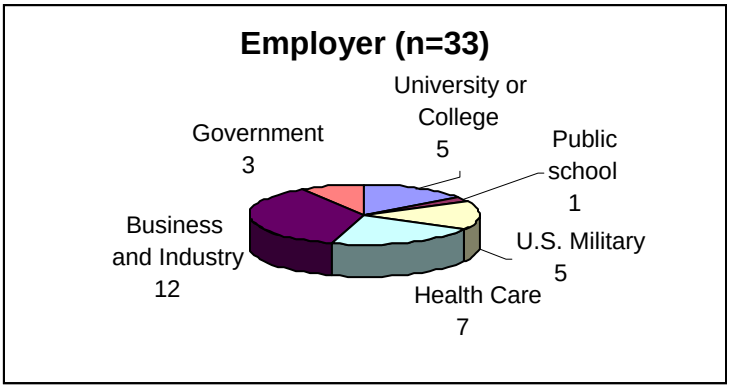
	STEM		Other	
	N	%	N	%
Completed degrees (n=46)	25	54%	21	45%
Students pursuing higher education (n=44)	36	82%	8	18%
Associates and technical degrees (n=8)	3	38%	5	62%
Bachelor's degrees (n=31)	16	52%	15	48%
Master's and doctorates (n=7)	6	86%	1	14%

[25] One respondent provided no information about the level of education or field of study.

4.9 Workforce Participation

Overall, 38% of student participants were employed full-time, 35% were part-time, 15% were unemployed but looking for work, and 12% were out of the workforce. Of the student respondents reporting full-time employment, the largest proportion (37%) worked in business and industry (see Figure 1). Asked whether proficiency in one of the STEM fields is a necessary requirement of their jobs, 55% of those working full-time responded "to a great extent."

Figure 1



Since some students were still in school at the time of the survey, we looked at workforce participation by cohort. As would be expected, those in the earlier cohorts had higher rates of employment. As shown in Table 12, approximately 60% of student participants in the 1997-2000 cohorts were working full-time, and most of the others were working part-time. Fewer students in the later cohorts were working full time; more were working part-time, and a sizeable percentage was unemployed and looking for work.

Table 12—Workforce status of student participants

Cohort	Working Full-time		Working Part-time		Not working-looking for work		Not working-not looking for work		Total	
	N	%	N	%	N	%	N	%	N	%
1997-1998	14	61%	7	30%	1	4%	1	4%	23	99%
1999-2000	13	59%	8	36%	1	5%	0	0%	22	100%
2001-2002	3	19%	4	25%	5	31%	4	25%	16	100%
2003-2004	3	12%	11	44%	6	24%	5	20%	25	100%
Total	**33**	**38%**	**30**	**35%**	**13**	**15%**	**10**	**12%**	**86**	**100%**

Note: Percentages in this table may not total 100% due to rounding.

Asked if their current jobs (full- or part-time) required proficiency in STEM, close to half of student participants said a "great extent" and 31% said "somewhat." Asked to project ahead to their future careers, most participants indicated that proficiency in STEM would probably be a requirement. (See Table 13.)

Table 13—Students' opinions about STEM proficiency requirements of current jobs and future career				
	STEM proficiency is a requirement of current job		**STEM proficiency will be a requirement in future career**	
	N	%	N	%
To a great extent	29	46%	65	74%
Somewhat	19	31%	21	24%
Not at all	14	23%	2	2%
Total	**62**	**100%**	**88**	**100%**

To assess the extent to which the investment in students is likely to directly benefit the Appalachian region, we compared the percentage of student participants who were currently living in the region with the percentage who projected they would still be there in five years. At the time they attended the Summer Institute, all students lived in the Appalachian region. At the time of the survey, 59% lived in the region, and 53% of the total group of student participants thought they would be living in some part of the region five years hence. There was virtually no difference in the percentage of respondents who planned to remain in the region between those who majored in STEM and those who majored in non-STEM fields (66% vs. 65%, respectively).

As shown in Table 14, earlier (1997-2000), and later (2001-04) cohorts did not differ appreciably in terms of the proportion currently residing in the Appalachian region. However, compared with the early cohorts, a higher percentage of participants from the later cohorts thought they would be living in the region in five years. Because the number of participants who answered the question about future residence was low (N=49), findings should be interpreted with caution.

Table 14—Students who currently live in the Appalachian Region (AR) and those who plan on living there in 5 years, by cohort				
Cohort	**Currently lives in AR**		**Plans to live in AR 5 years from now**	
	N	%	N	%
1997-2000	25	59%	13	46%
2001-2004	26	62%	13	62%

4.10 Student Recommendations

While many students indicated that there should be no changes or that they had no recommendations for increasing the Summer Institute's effectiveness, others pointed out some specific things that they felt would have made their positive experience even better. The student recommendations can be broadly grouped into two major categories: recommendations based on program activities and projects and recommendations related to program logistics.

In terms of the activities and projects, the students overwhelmingly reported a desire to select the project they were assigned to for the two weeks. Although in some years students were allowed to rank their project choices, one student stated that he did not really understand what they would actually be doing and wished he had had more information in order to make a more appropriate choice. Some other recommendations from students that relate to projects and activities included:

- Offer more medical and math-related projects.
- Offer more hands-on projects.
- Increase communication between students working on different projects.
- Obtain participant feedback about the strengths and weakness of specific projects.
- Increase interaction between students and teachers.
- Continue access to the newest technology, especially computer technology.

The second group of recommendations focuses on the logistics and design of the entire program. Student recommendations for strengthening the program included the following:

- Operate the program for longer than two weeks.
- Invite more students to attend the program.
- Focus on low-income students with less support and expand the age range.
- Increase publicity to make students more aware of the program. Ensure that the person disseminating information at the school can explain the recruitment and application process as well as the target population. (For instance one student recommended targeting students "with potential who may not, themselves, see it.")
- Involve graduate student scientists or young professionals in the program as role models.

This last recommendation, which was suggested in various ways by many students, was an innovative recommendation to help "bridge the gap" between the professional scientists and high school participants. Some students recommended that graduate students could be invited to speak to the group or play a mentoring role. As one student pointed out, this would help students "see science as something that could be in their future," providing them the opportunity to "meet [college or graduate] students who were enthusiastic and interested in science." A few other

students recommended bringing past attendees back to the institute as junior counselors who could serve this “bridging” role.

Regardless of whether some students are invited back as junior counselors or not, many students expressed the desire to have a reunion with others in their cohort or at least a more effective way of maintaining contact with each other. As one student stated, this could really “keep the excitement and energy going.”