

ATTITUDES, EDUCATIONAL, AND CAREER CHOICES OF FOOD AND AGRICULTURAL SCIENCES INSTITUTE PARTICIPANTS

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Abstract

Ethnic minority students traditionally pursue degrees and careers in the food and agricultural sciences at rates lower than their non-minority counterparts. To help improve upon this situation, the Food and Agricultural Sciences Institute (FASI) was created to expose academically talented high school students to opportunities within the food and agricultural sciences. FASI provided a week of laboratory experiments, classroom discussions, hands-on activities and demonstrations, and tours of departments in a college of agricultural sciences. Building upon prior research that had assessed the immediate and short term benefits of FASI, this study examined long-term contributions to the attitudes, educational, and career choices of the 1994-2001 FASI participants. Participants from these years were studied because they would have now graduated from high school given that they were high school sophomores and juniors when they participated in FASI. Fifty-seven individuals responded to a survey instrument. The major finding was that the respondents had positive attitudes toward the food and agricultural sciences, but few had pursued degrees or careers in the food and agricultural sciences. Personal factors, parents, and family members most influenced their educational and career choices.

Introduction

For several decades, ethnic minority students have tended to pursue degrees in fields other than the food and agricultural sciences. One consequence is that African Americans have been and continue to be underrepresented in most areas of the agricultural sciences (Dobbins, King, Fravel, Keels, & Covington, 2002). Also, Cox (2000) stated that, "They [minorities] are not enrolled in classes or involved in organizations to teach them the composition of the food and agricultural sciences" (p. 2). To counter this persistent problem, high schools and colleges have been encouraged to collaborate to help students learn what is required to succeed after high school. Also, several authors have recommended that students be provided experiences that build their understanding of postsecondary opportunities in the agricultural sciences.

Such experiences are critical. Robinson, Garton, and Washburn (2007) explored factors first-time college of agriculture enrollees used when making college choices and found that a visit to the campus was the most useful source of information. Also, Burns (2006) found that a visit to campus was the most useful source of information when African American students made college choices. These findings support Jenkins's (2003) premise that minority youth need college and career exploration, exposure, and planning to succeed beyond high school.

To help address this problem, the Food and Agricultural Sciences Institute (FASI) was established in 1994 by The Pennsylvania State University's College of Agricultural Sciences. FASI introduced science-minded ethnic minority students to educational, career, and research opportunities. During a weeklong

experience, the participants lived in campus housing and interacted with almost 50 faculty, staff, and students. They participated in numerous laboratory sessions and toured turfgrass plots; flower gardens; animal, dairy, and poultry research facilities; and mushroom research facilities. They also participated in urban forestry experiences, fish population counts, and global positioning and geospatial activities. In total, the FASI experience provided a comprehensive overview of the food and agricultural sciences and related educational and career opportunities.

Literature Review

Many of America's youth are at risk of not developing into responsible, contributing adults (Riggs, Lee, Marshall, Serfustini, & Bunnell, 2006). This may be related to the fact that almost 25% of students do not graduate from high school. Also, from an ethnicity perspective, the dropout rate is nearly twice as high for African American and Latino students (America's Promise, 2007). Even more surprising is the belief (Anderson, 2006) that underrepresented minorities tend to struggle to find instructors, classmates, and programs with which they feel a connection [between individuals and institutions]. Also, Anderson indicated that educators have observed a decline in the academic motivation and achievement of their students. To combat this issue, America's Promise suggests that, "all children need the intellectual development, motivation, and skills that equip them for successful work and lifelong learning. These result from having quality learning environments, challenging expectations, and consistent guidance and mentoring" (p. 1).

Although various strategies can be implemented to increase student interest in attending postsecondary institutions and to ultimately make career decisions, a common strategy includes early enrichment and intervention programs. For example, Westbrook (2004) found that enrichment programs were a key strategy that 1890 land grant universities employed to recruit and retain African American students in the agricultural sciences. Also, early

intervention programs have been used to facilitate seamless transitions from elementary to secondary to higher education (Fenske, Geranios, & Keller, 1997). The underlying assumption is that early intervention in the educational pipeline will help prevent dropouts and increase the number of students who pursue higher education (Fenske et al.). A similar outcome is achieved with academic outreach programs that may have different missions than early intervention programs. Finally, Fenske et al. noted that, "academic programs that originate in schools, colleges, and universities are a subset of the broader concept of early intervention" (p. 2).

Although some academic programs encourage students to plan for college without focusing on a specific discipline, other programs focus on preparation and recruitment of promising students for selected disciplines (Fenske et al., 1997). Two such examples that focus on the food and agricultural sciences are the Institute for Future Ag Leaders (IFAL) and the Research Apprenticeship Program (RAP).

The IFAL provides high school students opportunities to learn about educational and career options. Students attend this weeklong program sponsored by the Department of Agribusiness, Applied Economics and Agriscience Education at North Carolina A&T State University. Rising seniors in the top third of their classes are exposed to career opportunities as well as the scientific and commercial aspects of agriculture (The Ag e-Dispatch, 2005).

The RAP program, which is a national internship initiative sponsored by the United States Department of Agriculture (USDA), provides high school students opportunities to work in an area of interest with an agricultural science professor. Students who participate in RAP complete culminating projects that typically include poster and paper presentations. Several universities offer RAP internships wherein students are mentored by a professor for several weeks during the summer. One example is Kentucky State University's Research and Extension Apprenticeship Program (REAP) that allows students to gain various experiences in the agricultural sciences and

natural resources. REAP has been successful because 95% of the interns have continued their postsecondary study and earned college degrees (Shelton, 2006).

Other academic areas also incorporate discipline-specific approaches because they have low or no ethnic minority participation. For instance, to increase minority participation in psychology, faculty at Harry S. Truman College in Chicago offered laboratory, clinical, and community research experiences for students interested in biomedical research (Sleek, 1999). In 1996, the University of Wisconsin-Madison joined the effort by incorporating the Pre-College Enrichment Opportunity Program for Learning Excellence (PEOPLE) PREP. This initiative (PEOPLE PREP, 2007) is a partnership between UW-Madison; the students and their parents; and teachers, counselors, and administrators in several school districts in Wisconsin. PEOPLE PREP's main goal is to provide sustained individual attention critical for students to become academically, psychologically, and culturally prepared to succeed in college.

In addition to early intervention and academic programs, several factors have been identified as being important in helping students decide their educational futures. For example, a student's family background and home experiences exert powerful influences over educational outcomes (Hammond, Linton, Smink, & Drew, 2007). Also, Russell and Atwater (2005) examined factors that impacted African American undergraduates' perseverance in a biology program throughout the high school and college pipeline. Students reported that family expectations were positive influences on their pursuit of degrees.

Other researchers have also identified family influences on the educational and career decision-making processes. For example, Rocca (2005) examined recruitment efforts affecting the decision-making processes of high school and

transfer matriculants into the College of Agricultural and Life Sciences at the University of Florida. Parents and guardians were identified as the most influential individuals when students make decisions about college. Meanwhile, Asare (2007) identified similar human and exposure factors when he studied the attitudes of African American and Latino junior high and high school students toward veterinary medicine. A deficiency of minority role models, a lack of interest in and enjoyment of veterinary medicine, and inadequate student exposure to the profession were key factors in the lack of racial diversity. Strong parental support was also identified as a factor that students need to pursue veterinary medicine.

Theoretical Framework

The research literature contains countless ex-post facto studies wherein ethnic minority respondents were asked to recall the importance of individuals, expectations, and exposure in informing them about opportunities in the food and agricultural sciences. However, few studies have examined whether early intervention and academic programs lead to the desired educational and career behaviors. Such studies are critical because Super (1957, p. 81) stated that "Adolescence is clearly a period of exploration." Consequently, the theoretical framework for this study was the Swanson Model (1972) that Wiley (1996) used in a follow-up study of FASI participants. This model posits that individuals must acquire the needed educational experiences and knowledge before they can develop the attitudes necessary to behave in the desired manner. According to Wiley, as individuals become knowledgeable of and experienced in an area, they will gradually begin to attach positive connotations to that area and then behave in a desired manner. Figure 1 displays the relationships among factors in the Swanson Model.

Education → Knowledge → Attitudes → Behavior

Figure 1. Assumed relationships among education, knowledge, attitude, and behavior (Swanson, 1972).

For this longitudinal study, an underlying premise was that the findings of Wiley (1996) and Cox (2000) had sufficiently documented that FASI had provided the educational experiences and knowledge that the participants needed to develop the desired positive attitudes. However, sufficient time had to elapse before it could be determined whether (1) those positive attitudes were stable, and (2) they had led to the desired behaviors consistent with the Swanson Model. Consequently, this research examined the following question: Are the positive attitudes of the FASI participants stable and did those attitudes lead the participants to subsequently pursue degrees and careers in the food and agricultural sciences?

Purpose and Research Questions

The purpose of this longitudinal descriptive study was to examine the attitudes that former FASI participants now have toward the food and agricultural sciences and factors that influenced their educational and career choices. To guide the study, three research questions were developed:

1. What attitudes do former participants hold about the food and agricultural sciences?
2. What educational programs have the former participants chosen, and what events and experiences most influenced their decisions?
3. What types of careers have the former participants chosen, and what events and experiences most influenced their decisions?

Methods and Procedures

The population for this longitudinal descriptive study consisted of former high school students ($N = 154$) who participated in FASI between 1994 and 2001. These

participants were studied because they would now have either completed a degree or certificate program, be completing a degree or certificate, or would be employed in an occupation.

Instrumentation

A two-part survey instrument was used to collect the needed data. The original version of the instrument was developed by Wiley (1996) and subsequently modified by Cox (2000), who examined the educational and career choices of the 1994 through 1997 FASI participants. Esters (2003) modified the instrument to explore the career development and decision-making of urban high school students who had been enrolled in a magnet agricultural high school. The Esters instrument had very high reliability (Cronbach's $\alpha = .88$). This instrument was further modified for this study and then reviewed for content and face validity by a panel of experts consisting of six faculty members and graduate students in the Department of Agricultural and Extension Education at The Pennsylvania State University.

Section one of the instrument included 31 Likert-type and open-ended items related to educational and career choices. One item asked participants whether they were or had been enrolled in a degree or certificate program since participating in FASI. If they had not, another item asked whether they planned to pursue a degree or certificate. Section two of the instrument included 10 Likert-type items that elicited participants' attitudes toward the food and agricultural sciences. The scale items ranged from 1 = *strongly disagree* to 4 = *strongly agree*.

Data Collection

This longitudinal research involving subjects who were transitioning into adulthood required special efforts to control frame error. Thus, prepaid return addressed postcards were mailed September 27, 2005, to obtain current names and addresses from

the former participants or their parents, close relatives, or guardians. The postcards also explained the significance of the study. Once the current contact information had been obtained, data for the study were collected in three stages using a mailed survey. The first contact was conducted on December 15, 2005, when a letter of introduction, an informed consent form, the survey instrument, and a prepaid return envelope were mailed to the former

participants. The first contact resulted in 25 instruments being returned. The second mail contact was conducted on January 17, 2006, and 18 additional instruments were returned. The final contact consisting of surface mail, calls, and e-mail was conducted on February 21, 2006, and resulted in 14 additional instruments being returned. Table 1 indicates that a total of 57 useable instruments (37%) were received.

Table 1

Number and Percentage of Returns from Participants (n = 57)

Time and Date of Mailing Contacts	Returns	
	<i>f</i>	%
1st contact December 15, 2005-January 16, 2006	25	43.8
2nd contact January 17, 2006-February 20, 2006	18	31.6
3rd contact February 21, 2006-March 2, 2006	14	24.6
Total	57	100.0

Note. *N* = 154.

To address nonresponse bias, the early (responses from the 1st contacts) and late respondents (Miller & Smith, 1983) were compared, and no significant differences were found ($p > .05$) on (1) whether they were enrolled in a degree program, (2) the influence that FASI had on their decisions to pursue a postsecondary degree, or (3) the influence that FASI had on their decisions about pursuing a career in the food and agricultural sciences. The researchers concluded that the respondents and nonrespondents were probably similar in most respects. However, consistent with Menard's (2002) logic about response rates for longitudinal studies, the researchers urged caution in generalizing the findings beyond the respondents. According to Menard (p. 40), "One may properly question whether the results of analyses of panel data with attrition rates of 50% or more can reasonably be generalized beyond the

respondents who were retained in the study."

Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences version 14.0. Given the response rate for this study, no attempt was made to generalize the findings to the population. Consequently, only descriptive statistics (frequencies, percentages, means, and standard deviations) were computed to analyze the data.

Findings

Research Question #1: What are the respondents' attitudes toward the food and agricultural sciences?

As shown in Table 2, the respondents exhibited positive attitudes toward the food and agricultural sciences on all 10 items.

The respondents expressed the highest agreement that (1) careers in the food and agricultural sciences touch the lives of all people each day and (2) the United States is very dependent upon people who work in the food and agricultural sciences. Meanwhile, the respondents disagreed that (1) growing up on a farm is necessary to obtain a career in the food and agricultural sciences, (2) courses in biology and chemistry are not needed for most careers in the food and agricultural sciences, and (3) that most careers in the food and agricultural sciences involve outdoor work in fields.

Two approaches were used to provide a context for the findings shown in Table 2. First, these findings were compared with the findings of a 2000 follow-up study of the

1994-1996 FASI participants (Cox, Bowen, & Bowen, 2001). The two groups were not completely equivalent, but their attitudes toward the food and agricultural sciences were very similar. In fact, on seven of the 10 attitudinal items, the 2006 respondents were more positive than the 2000 respondents. Second, another comparison was made to gauge the influence that participating in FASI had on attitudes toward the food and agricultural sciences. For this comparison, the findings in Table 2 were compared with those that Cox et al. observed in 2000 for individuals who were selected to participate in FASI from 1994-1996 but were unable to do so for various reasons. On all 10 attitudinal items, the 2006 respondents exhibited more positive attitudes than the nonparticipants.

Table 2

Attitudes Toward the Food and Agricultural Sciences (n = 57)

Items	Mean	SD
1. Careers in the food and agricultural sciences touch the lives of all people each day.	3.78	.41
2. Our nation is very dependent on people who work in the food and agricultural sciences.	3.70	.49
3. I personally know someone who has a career in the food and agricultural sciences.	2.49	1.03
4. I know very little about jobs or careers in the food and agricultural sciences.	2.22	.77
5. When I hear the words food and agricultural sciences, I usually think of farms with crops and animals.	2.21	.86
6. There are few businesses in Pennsylvania where I can have a professional career in the food and agricultural sciences.	1.89	.74
7. When I hear the words food and agricultural sciences, I seldom think of laboratories with testing equipment.	1.89	.69
8. Most careers in the food and agricultural sciences involve outdoor work in fields.	1.85	.66
9. Courses in biology and chemistry are not needed for most careers in the food and agricultural sciences.	1.60	.62
10. Growing up on a farm is necessary for a career in the food and agricultural sciences.	1.26	.44

Note. 1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree.

Research Question #2: What educational programs did the respondents choose after participating in FASI, and what events and experiences most influenced their decisions?

The former participants were asked whether they had been enrolled, were currently enrolled, or planned to enroll in a degree or certificate program. Of the 57 respondents, three had obtained an associate's degree, 34 a bachelor's degree, five a master's degree, one a Ph.D., and one person had completed a law degree (J.D.). Of the participants who had obtained a bachelor's degree, three had completed majors in the food and agricultural sciences (agricultural and extension education, agricultural sciences, and food science). Of the five individuals who had completed a master's degree, one person had completed the degree in food science. The person who had completed a Ph.D. degree studied pharmacology. Also, 28 respondents reported that they were currently enrolled in a degree or certificate program. When asked to provide majors currently being studied in a degree or certificate program, the respondents provided a wide range of

responses which included business management, bioengineering, kinesiology, and chemistry. One respondent was enrolled in food science and another in veterinary medicine. Further, of the 24 individuals not currently enrolled in a degree or certificate program, 15 reported that they planned to pursue a degree or certificate program, and nine did not plan to pursue a degree or certificate.

Influence of FASI on Decisions to Pursue a Postsecondary Degree. Table 3 summarizes the level of influence that FASI had on the former participants' decisions to pursue a postsecondary degree or certificate. Five individuals reported that FASI had a very high influence, and 13 reported a high influence on their decisions. However, for most of the former participants, FASI had limited influence on their decisions. An equal number of respondents (17) indicated that FASI had a low or no influence, whereas five individuals reported that FASI had very low influence on their decisions to pursue a degree.

Table 3
FASI Influence on Decisions to Pursue Degrees (n = 57)

Item	<i>f</i>	%
Very High Influence	5	8.8
High Influence	13	22.8
Low Influence	17	29.8
Very Low Influence	5	8.8
No Influence	17	29.8
Total	57	100.0

Events and/or Experiences That Most Influenced Decisions to Pursue a Postsecondary Degree. The respondents were asked to share an event or experience that most influenced their decisions to pursue a postsecondary degree. Twenty-three respondents (40.4%) reported that a

personal event or experience most influenced their decisions. Another 17 individuals (29.8%) identified a parent or family member, and nine respondents (15.8%) reported that FASI most influenced their decisions to pursue a postsecondary degree.

Research Question #3: What careers did the respondents choose after participating in FASI, and what events and experiences most influenced their decisions?

The respondents were asked whether they were currently employed or had been employed for more than one year since their FASI participation. Thirty-five participants (61.4%) reported that they had held a full-time position for one year or more since participating in FASI. However, only three individuals reported being employed in food and agricultural sciences or related fields (veterinary services, a dairy cooperative, and the Peace Corps).

Table 4
Influence of FASI on Career Choices (n = 57)

Item	<i>f</i>	%
Very High	1	1.8
High	7	12.3
Low	20	35.1
Very Low	7	12.3
No Influence	21	36.8
Missing	1	1.8
Total	57	100.0

Events and/or Experiences that Most Influenced Decisions to Pursue a Career.

The respondents were asked to share events or experiences that most influenced their decisions about pursuing or not pursuing a career in the food and agricultural sciences. Over one-half (31 or 54%) indicated that FASI had no influence on them pursuing a career in the food and agricultural sciences. Only eight respondents indicated that FASI most influenced their decisions to pursue a career in the food and agricultural sciences. One of these individuals had chosen a career in food science.

Influence of FASI on Career Choices. Table 4 summarizes responses about the influence that FASI had on the career choices of the respondents. One participant reported that FASI had a very high influence, and seven reported a high influence. However, for most individuals, FASI had limited influence on their choice of a career. Twenty individuals reported a low influence, seven a very low influence, and 21 indicated that FASI had no influence on their career choices.

Discussion, Conclusions, and Recommendations

The first research question examined the respondents' attitudes toward the food and agricultural sciences. On all 10 attitudinal items, the 2006 respondents exhibited the desired positive attitudes. Also, when compared with the 1994-1996 FASI participants who were surveyed in 2000, both groups had similar attitudes. In addition, on 7 of the 10 attitudinal items, the 2006 respondents were even more positive than the 2000 respondents. Second, when compared with individuals who were

selected to participate in FASI but did not for various reasons, the 2006 respondents exhibited more positive attitudes than the nonparticipants. Collectively, these findings suggest that the positive attitudes developed from participating in FASI were being maintained. From a theoretical standpoint, these findings support the premise of the Swanson Model (1972) that individuals must acquire the needed educational experiences and knowledge before they can develop the attitudes necessary to behave in the desired manner.

The second research question focused on the educational programs that the respondents chose after they participated in FASI. Several factors were discovered that influenced the respondents' educational and career choices. Parents, other family members, and personal factors most influenced their decisions to pursue a postsecondary education. This study's findings are similar to those of Rocca (2005), who found that parents and guardians were the most influential individuals on students when they make decisions about college.

Also, the National Dropout Prevention Center reported that a student's family background and home experience exert powerful influences over educational outcomes (Hammond et al., 2007). Similar studies have found that family support is influential for increasing the academic achievement of underrepresented [minority] students (Anderson, 2006; Findlay & Rawls, 1984) and postsecondary decisions (Burns, 2006; Robinson et al., 2007; Westbrook, 2004).

Research question two also focused on the behavioral dimension of the Swanson Model (1972). Conceptually, one measure of behavior could be the pursuit of higher education after participating in programs and experiences designed to develop the desired positive attitudes. However, no related research was identified that could be used as a benchmark to empirically assess the extent to which this dimension was achieved with this group of students. In this study, 34 of the 57 respondents had completed bachelor's degrees, five a master's degree, one a Ph.D., and one a law degree (J.D.). Yet, only three of the

bachelor's degrees and one master's degree had been completed in food and agricultural sciences majors. One could conclude from these findings that having positive attitudes is necessary but not sufficient to entice these ethnic minority students to pursue majors in colleges of agricultural sciences. One plausible explanation is that these students were being heavily recruited for science and health-oriented majors by various types of colleges and universities. Consequently, when competing for high school students of this caliber, multiple approaches must be employed over an extended period of time before they graduate to also influence the family and personal factors discussed earlier.

The third research question also focused on the behavioral dimension of the Swanson Model because it examined career choices that the respondents made after participating in FASI. Observations similar to those for educational behaviors are warranted. Few individuals indicated that FASI most influenced their decisions to choose careers in the food and agricultural sciences. In fact, over one-half ($n = 31$, or 54%) indicated that FASI had no influence on them pursuing a career in the food and agricultural sciences. However, eight participants indicated that FASI most influenced their decisions. Even so, only three respondents indicated that they were employed in food and agricultural sciences careers. Again, relevant research that focused on career behaviors was not identified to provide benchmarks needed to make definitive comparisons. However, based on the findings for this group of respondents, one can conclude that FASI had a positive influence on the attitudes that they developed toward the food and agricultural sciences but only marginally impacted their career behaviors.

Plausible answers for the career behaviors observed in this study can perhaps be found through research that focused on factors that impact career decisions. For example, Wildman and Torres (2001) reported that family influences impacted students' decisions to pursue an agriculturally related career. Findlay and Rawls (1984) also indicated that family factors influenced the agricultural career objectives of students attending historically

black universities. As suggested by Esters (2003), in the early stages of their education, students need to become aware of career opportunities.

Based upon the study's findings, the following recommendations were made:

1. Colleges of agricultural sciences should continue enrichment and awareness programs such as FASI that enable minority youth to understand the educational and career opportunities in the food and agricultural sciences and develop the desired attitudes.
2. Recruitment efforts that target ethnic minority students should also focus on their parents, guardians, family members, and personal factors that related research has identified as impacting the educational and career decision-making process.
3. More systematic, longitudinal research is needed to understand the complex interactions and dynamics inherent in moving young adults beyond the development of positive attitudes to the desired behaviors such as pursuing degrees and careers in the food and agricultural sciences.

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