

# Engaging Under-Represented Youth in Food, Agriculture and Natural Resources through Pre-College Residential Summer Programs<sup>1</sup>



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## **Abstract**

Since 1982, the College of Agriculture and Natural Resources has offered pre-college, residential summer programming to increase the number of under-represented students pursuing post-secondary education and earning degrees in food, agriculture and natural resources (FANR). In 2003-2008, pre-and-post surveys were conducted for participants in the one-week Agriculture and Natural Resources Institute for Multicultural Students (AIMS) Program and the six-week Multicultural Apprenticeship Program (MAP) to assess (1) each program's effect on participants' perceptions of (a) higher education and (b) FANR and (2) to assess whether the programs differed in their effect on students. A pre-survey was administered to explore perceptions that parents of under-represented students have about FANR. The AIMS participants gained an enhanced understanding of what it is like to be in college and greater understanding that careers in FANR extend beyond working on a farm. The MAP participants gained an increased understanding of those areas, but also grew in their understanding of (a) courses needed for college; (b) the college experience; and (c) their general understanding of FANR. While both programs positively influenced students, the influence was greater in the longer, more intense program. Overall, parents encouraged their students' interests in FANR.

## **Introduction**

Increasing the number of under-represented students in food, agriculture and natural resources (FANR) has been a concern of the College of Agriculture and Natural Resources (CANR) at Michigan State University (MSU) since the early 1980's. Changing

U.S. demographics and employment needs in the food, agriculture, and natural resources system (FANRS) heighten the need to recruit students from all racial and ethnic segments of the U.S. population and to increase recruitment of women (APLU, 2009; Hill et al., 2010; Goecker et al., 2010; National Research Council, 2009). Historically, minorities and women have been under-represented in these disciplines and that remains unchanged today (APLU, 2009; Foster and Henson, 1992; Hill et al., 2010; Moss, 2011; National Research Council, 2009; Warren and Alston, 2007).

Estimates indicate that between 2010 and 2015 there will be approximately 54,400 annual job openings in the U.S. FANRS for new graduates (Goecker et al., 2010). Only 53,500 graduates are expected to be available annually for these positions, and only 55% of those graduates are expected to have earned degrees from colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine (Goecker et al., 2010). Allied disciplines like biological sciences, engineering, health sciences, business, and communication are expected to provide the remaining 45%, although employers prefer graduates from the colleges of agriculture and life sciences, forestry and natural resources, and veterinary medicine, because they tend to have stronger interests in FANRS and greater work experience in these disciplines (Goecker et al., 2010).

A National Research Council (2009) report presented several recommendations for achieving diversity and for increasing student numbers in agricultural education. One encouraged colleges and universities with agricultural programs to reach out to K-12 students and teachers to expose them to

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agricultural topics and careers. The need is two-fold: to increase the number of under-represented students who enroll in and graduate from college and to increase the number who study disciplines in FANRS. Many pre-college programs seek to address college recruitment of under-represented students (Harkness et al., 2011; Perna, 2002, 2006; Perna and Titus, 2005; Strayhorn, 2010, 2011; Walsh, 2011) and some programs have the added emphasis of exposing students to agriculture (Esters, 2007; Gale, 2002; Larke and Talbert, 1993; Reese, 2005).

**Objectives**

The objectives of this study were to:

- (1) Assess the effect of AIMS and MAP on perceptions that under-represented students had about (a) higher education and (b) food, agriculture and natural resources (FANR).
- (2) Assess whether or not the MAP and AIMS programs differed in their effect on student perceptions about higher education and/or FANR.
- (3) Explore attitudes that parents of under-represented students had about FANR.

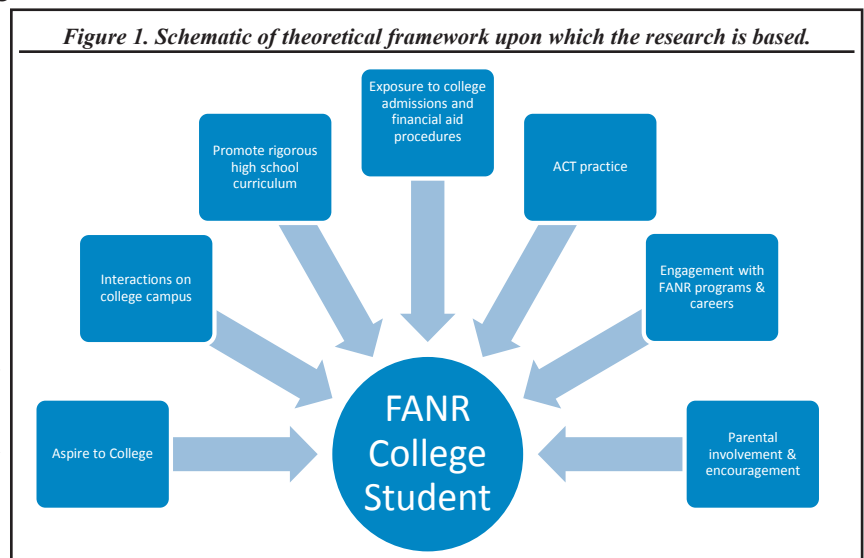
**Theoretical Framework For Recruiting Under-Represented Pre-College Students to Higher Education and FANR**

Perna (2002) identified 11 critical predictors for college enrollment for under-represented students, the first five of which were addressed by a fourth of pre-college programs: (1) developing student desire to attend college; (2) fostering college tours, visits or fairs; (3) promoting a rigorous high school curriculum; (4) including parental involvement “to facilitate predisposition and choice;” (5) initiating involvement with students by the 8th grade in order to attract students early in their K-12 experience; (6) promoting college awareness or exposure with regard to admissions processes and financial aid; (7) development of academic skills; (8) promoting parent college awareness; (9) providing parent FAFSA (Free Application for Federal Student Aid) information and participation using the form; (10) SAT/ACT training; and (11) providing tuition or scholarships. Many of the preceding critical components also were identified by other research (Choy, 2002; Harkness et al., 2011; Perna, 2006; Perna and Titus, 2005; Reese, 2005; Strayhorn, 2010b, 2011).

The important role of parental involvement and encouragement is stressed by Strayhorn (2010a) with regard to math achievement by Black high school students, Perna and Titus (2005) with regard to the effect that different types of parental involvement have on college enrollment depending upon ethnic/racial groups, and Strayhorn (2010b) with regard to the effect of parental involvement and encouragement on college enrollment of under-represented students.

Lynch (2001) reported personal decision (83%), former teachers and a college faculty member (55%), and parents (53%), as the three most influential factors affecting a minority student’s decision to select a major in agriculture at Virginia Tech. Additionally, 46% of the participants previously had been in a high school or college summer agricultural intern program. Prior experience in agriculture was identified by Wildman and Torres (2002) as the most influential reason for selecting a major in agriculture. Esters (2007) reported that high school grade point average and influence of the female guardian were the most important determining factors of whether or not urban agricultural education students enrolled in a post-secondary agriculture program. An agriculture summer research internship program for minority high school and college students at Iowa State University (Gale, 2002) resulted in encouragement of 49% of the 60 students to pursue careers related to agriculture. Study of a four-week residential high school summer enrichment and agricultural literacy program for gifted and talented students at Virginia Tech (Cannon et al., 2006) indicated that students gained in knowledge and perceptions of the agricultural industry, but the program did not influence participants’ career choices. Medicine/physician was the career choice most selected by participants.

The theoretical framework for this study (Figure 1)



## Engaging Under-Represented

was grounded in the concept that the following factors influence under-represented pre-college students to pursue higher education and/or FANR careers: (1) developing student desire to attend college; (2) fostering visitation of and interaction with various MSU programs; (3) promoting a rigorous high school curriculum; (4) promoting college awareness and exposure to admissions and financial aid procedures; (5) providing ACT practice; (6) providing interaction with food, agriculture and natural resources programs and careers; and (7) parental attitudes about FANR (Perna, 2002; Lynch, 2001; Perna 2002; Perna and Titus, 2005; Strayhorn, 2010b; and Wildman and Torres, 2002).

### Program Description and Methods

The Michigan State University Institutional Review Board approved the study protocol and all participants and their parents or guardians provided written informed consent prior to participation in the study.

### Interchangeable Use of Terms FANR and ANR

The Department of Food Science and Human Nutrition, which contains the disciplines of food science and dietetics, is part of CANR. Additionally, key disciplines in CANR such as crop and soil sciences; animal science; horticulture; and agriculture, food, and resource economics are intricately linked to food production, storage, distribution, processing, and/or utilization. Food science, the key disciplines, and the natural resources disciplines at MSU historically have been referred to collectively as agriculture and natural resources (ANR). Consequently, AIMS and MAP participants were exposed literally to careers in food, agriculture, and natural resources. The term food, agriculture, and natural resources (FANR or its variants) has increased in usage nationally since 2009 (APLU, 2009 and National Research Council, 2009). Thus, ANR and FANR are used interchangeably in this paper, even though ANR was used when the research was initiated in 2003. The term FANR is preferred, because it more visibly communicates the inclusion, in this study, of the food-related disciplines. Tables in the text refer to ANR, since that wording was used when the surveys were conducted.

### Multicultural Apprenticeship Program (MAP)

The MAP, previously known as Minority Apprenticeship Program, began at MSU in the summer of 1982. The program was designed to (1)

introduce under-represented pre-college students to careers in FANR, (2) inform participants about the MSU admissions process and college preparatory coursework, (3) introduce participants to college life, and (4) recruit participants into majors in the CANR. After passage of proposal 2 in Michigan in November 2006 prohibiting recruitment on the basis of race, ethnicity or gender, item number one above was changed to attracting students from urban areas. This six-week residential program paired students with mentors in CANR, the Michigan Department of Agriculture, and/or Michigan Department of Natural Resources to work on research projects and interact with faculty, staff, and students from the mentor's unit from 8:30 a.m. to 4:00 p.m. each weekday. Participants attended interactive evening workshops and seminars on leadership development, FANR careers, personality styles assessments, admission to MSU, financial aid, and instructions on giving PowerPoint presentations. Students took field trips to the forest and bird sanctuary at the Kellogg Biological Station, a MSU research field station with a focus on fundamental and applied research in ecology and agriculture.

Recreational activities included canoeing; picnics; local amusement venues; and attending the campus Pow Wow, a gathering of American Indians that involved traditional dance and singing, socializing, and honoring Native culture. Since the inception of MAP, students have earned weekly stipends of \$45 to \$75 and within the last eight years have been required to save 50% of the summer stipend in a bank account. At the closing event for the summer program, each participant gave a five-minute oral presentation before peers, mentors, and parents explaining their MAP experience; research projects, findings and research skills acquired; seminars they valued the most; field trips; and social activities throughout the summer.

Application to the program included a transcript, two letters of recommendation, and completion of six essay questions. Students were selected by a committee of CANR faculty, staff, and administrators and the program was coordinated by the CANR Office of Academic and Student Affairs. Approximately, 25 students per year were selected from a national pool of students, although most applicants were from Michigan and were entering grades 10 through 12.

### ANR Institute for Multicultural Students (AIMS)

Initiated in 1994, AIMS (previously known as ANR Institute for Minority Students) was a one-week residential program that gave high school students a broad exposure to FANR. Participants engaged in

demonstrations, FANR-related field trips, and other hands-on activities that introduced them to careers in FANR and college life. Interactive evening seminars educated students about high school college preparatory course work, MSU admissions requirements, and information about the FAFSA process. Approximately, 15 students in grades 9 through 12 were selected each year based upon an application process very similar to that of MAP.

### The ACT Test

The ACT program was initiated as an additional tool to assist participants in gaining admission to college, preferably MSU. In summer 2004, year-long access to online ACT preparatory programs became available to students in AIMS and MAP. Students in MAP were required to spend six hours each week on the ACT, and AIMS students spent one hour each night of their campus stay. Both MAP and AIMS participants were encouraged to use the program regularly throughout the ensuing school year. The Kaplan online ACT program was used the first year, but Bridges Test Gear has been used since 2005. Mention of programs does not constitute endorsement.

### Procedures

The study was conducted from 2003-2008 and included AIMS and MAP students and their parents. Pre- and post-survey data were collected from students and pre-survey data from parents. All pre-survey data were gathered at the close of orientation sessions of AIMS and MAP. Post-survey data were collected at the completion of each program. Student pre- and post-surveys consisted of three sections (1) five questions on students' knowledge and perceptions of college, (2) eight questions about FANR, and (3) a demographic section including gender, academic level, ethnic/racial group, information about residential locale, and level of diversity in their home community. A five-point Likert scale including (1) strongly agree, (2) agree, (3) undecided, (4) disagree, and (5) strongly disagree was used for the first and second sections of the student surveys and for the parent survey.

The survey instruments were developed by the AIMS and MAP program director along with the associate dean for undergraduate programs in the college. Survey questions were based upon goals the college set for the programs and were not tested prior to initial administration of the survey. Cronbach's alpha analysis was conducted (Garson, 2011; Santos, 1999) to assess reliability of the survey instrument. The Cronbach's alpha of 0.62 for student survey questions about higher education, and 0.73 for student survey

questions about FANR suggested that the instruments were valid (Garson, 2011; Santos, 1999), but the alpha of 0.53 for the parent survey is lower than the normally accepted value of 0.60.

All participants in the programs, a total of 207 during the survey period, were asked to participate in the pre- and post-surveys. Parents or guardians (N = 165) accompanying participants to the orientation programs each year were asked to complete a survey during the orientation for each program.

### Statistical Analysis

Data were analyzed by IBM SPSS Statistics 19, formerly named Statistical Package for the Social Sciences. The Independent Samples T-Test was utilized when comparing two means. One-way ANOVA was utilized when comparing more than two means, followed by Tukey B mean analysis when the F value was significant at  $P \leq 0.05$ . Using SPSS, composite scores were calculated for the sections "perceptions of higher education" and "perceptions of FANR" by averaging the mean response for each item in that section and composite scores were analyzed as the other data. In order to complete the objectives of the study, student survey data were analyzed across programs, between programs, and within programs. Since no post-surveys were given to parents, standard deviation is indicated for parent pre-survey responses.

## Results and Discussion

### Demographic Profile of AIMS and MAP Students

Both programs were successful in attracting under-represented students (Table 1): 68 and 11%, respectively, African American and Hispanic/Latino students in MAP and 75 and 6%, respectively, African American and Hispanic/Latino students in AIMS. Attracting under-represented students is not unusual for programs that target this group (Gale, 2002; Larke and Talbert, 1993; Moss, 2011). However, it is significant that MAP and AIMS maintained their ability to do this after passage of Michigan's Proposal 2, which some feared would decrease inclusion of under-represented groups in university-related programs.

The majority of participants in both programs were females (Table 1), similar to other pre-college programs (Anderson and Kim, 2009; Gale, 2002; Moss, 2011; and Warren and Alston, 2007). Although Perna (2002) recommended initiating involvement with students by their 8th grade year, the majority of MAP and AIMS students were entering the 11th and 12th grades (Table 1), as is often the case with agriculturally-related pre-college programs (Gale, 2002; Larke and Talbert,



**Table 1. Description of participants in MAP and AIMS summer pre-college programs, 2003 – 2008.**  
total N = 119 for MAP and 88 for AIMS.

Characteristic	MAP	AIMS
	N	N
<b>Ethnic/Racial Category</b>		
African American/Black	81	66
Asian American/Pacific Islander	6	2
Hispanic/Latino	13	5
Native American/American Indian	6	1
White/Caucasian	6	7
Mixed/Biracial	4	5
Other	3	1
Unreported	--	1
<b>Gender</b>		
Female	71	59
Male	48	29
<b>Grade Level</b>		
9th	--	8
10th	19	27
11th	45	31
12th	54	22
Unreported	1	1
<b>Diversity of Home Community</b>		
All from same race as you	9	13
Mostly the same race as you	48	35
Mostly from different racial/ethnic background than you	38	20
Almost all from different racial/ethnic background than you	24	19
Unreported	--	1
<b>Home Community</b>		
Rural/Country	6	8
Suburban/Town	40	27
Urban/City	72	52
Unreported	1	1

1993). Approximately 50% of students came from diverse communities, and the majority were from urban areas (Table 1). The programs succeeded in attracting students who normally may not have been exposed to FANR.

## Perceptions of Higher Education

When pre- and post-survey data were analyzed across programs (Table 2), there was a significant increase in student understanding of the process for applying to college and of what it is like to attend college. Further analysis indicated that post-survey changes in these areas were due primarily to perceptual changes by students in MAP (Table 2). After participation in MAP (Table 2), students were more knowledgeable about high school course work needed for college preparation, the college application process, and

college life. In comparison, AIMS helped students learn more about college life, but had no significant effect in other areas (Table 2). Students expressed a strong desire to attain post-secondary education at the outset in both programs and that remained unchanged.

Post-survey composite scores were significantly different for perceptions of higher education across programs (Table 2) and for MAP (Table 2). Although both AIMS and MAP students believed they had the knowledge and ability to attend post-secondary education, the AIMS students were less certain than MAP students in pre- and post-surveys (Table 3). The data suggest that MAP students had a greater change in their perceptions of higher education than AIMS students in all areas except desire to attend college and knowledge about the process of applying to post-secondary institutions (Table 3). The MAP students were on campus five weeks longer than AIMS students and worked more intensely with the ACT preparation program, possibly accounting for some of the differences in post-survey results between the two programs.

## Perceptions of Food, Agriculture and Natural Resources

Across programs, students gained a greater understanding that working on a farm is only one aspect of ANR (Table 4), having a career in ANR does not mean working for low wages or salaries, wildlife management is part of ANR at MSU, and concluded that learning about ANR is not boring. However, pre- and post-survey analyses within programs (Table 4) showed that the overall change was primarily because of changed perceptions by MAP students (Table 4) where significant differences existed between pre- and post-responses for five of the seven items in this section and for composite data. In contrast, the only

**Table 2. Pre- and post-survey responses regarding perceptions of higher education by MAP and AIMS students, 2003 – 2008.**  
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey N = 207	Post-Survey N = 172	Pre-Survey N = 119	Post-Survey N = 92	Pre-Survey N = 88	Post-Survey N = 80
I plan to attend college or vocational school	1.07	1.05 NS	1.07	1.00 NS	1.07	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.23	1.19 NS	1.17	1.12 NS	1.32	1.27 NS
I know the classes to take in high school to prepare for college or vocational school	1.68	1.55 NS	1.62	1.34***	1.76	1.80 NS
I know the process of applying to college or vocational school	2.05	1.76***	2.03	1.66***	2.07	1.88 NS
I know what it is like to be in college	2.33	1.47***	2.29	1.34***	2.40	1.63***
Composite score	1.68	1.48***	1.63	1.35***	1.75	1.62 NS

NS, \*\*\* Indicates non-significance or significant difference for means between columns across programs or between columns within a program at P ≤ 0.001, respectively, according to Independent Samples T-test.  
\*Composite scores were calculated by averaging the mean of all responses in each column.

**Table 3. Comparison of pre- and post-survey responses between MAP and AIMS students, regarding perceptions of higher education. 2003 – 2008.**  
*Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.*

Perceptions of higher education	MAP		AIMS	
	Pre-Survey N = 119	Post-Survey N = 88	Pre-Survey N = 92	Post-Survey N = 80
I plan to attend college or vocational school	1.07	1.07 NS	1.00	1.10 NS
I have the knowledge/ability to attend college or vocational school	1.17	1.32*	1.12	1.27*
I know the classes to take in high school to prepare for college or vocational school	1.62	1.76 NS	1.34	1.80***
I know the process of applying to college or vocational school	2.03	2.07 NS	1.66	1.88 NS
I know what it is like to be in college	2.29	2.40 NS	1.34	1.63**
²Composite score	1.63	1.75	1.35	1.62***

NS, \*, \*\*, \*\*\* Indicates non-significance or significant difference for means between columns comparing programs for pre- or post-surveys at  $P \leq 0.05$ ,  $P \leq 0.01$ , or  $P \leq 0.001$ , respectively, according to Independent Samples T-test.  
 ²Composite scores were calculated by averaging the mean of all responses in each column.

significant change for AIMS students with regard to ANR perceptions was the increased understanding that working on a farm is only one facet of ANR (Table 4). The longer, more involved experiences of MAP appeared to help students develop a more positive perception about ANR. Fortunately, both MAP and AIMS students entered the programs with the understanding that protecting the environment is valuable and that ANR is science-based.

**Perceptions as Affected by Grade Level, Gender and Type of Residential Community**

Only a few pre- or post-survey responses varied by grade level, gender, or type of residential community (Table 5), similar to findings by Newsom-Stewart and Sutphin (1994) regarding lack of gender differences. Initially, 9th graders were less confident than other students that they had the knowledge or ability to attend college, but 9th graders’ response did not differ from the response of students in other grade levels by the conclusion of the programs. Females were less confident about having the knowledge or ability to attend college than were males and this did not change by the end of the programs (Table 5). Given current information, it is not possible to tell if a greater number of female mentors would have changed the

view of female participants. The AIMS and MAP program staff were approximately 50% female and included individuals from various racial backgrounds as was the case with many of the evening seminar presenters. However, departmental faculty and graduate students who served as mentors were almost all white males, a constraint that was beyond the control of the director of AIMS and MAP. Palmer et al. (2010) credited the racial composition of historically Black colleges and universities as being important in helping facilitate academic

achievement of black males, citing role models as an example. Hill et al. (2010) cited instances where girls thought boys were better at specific tasks than they and offered suggestions that may be categorized as changing the climate for girls.

Students from rural communities initially indicated significantly less knowledge about the process for applying to college or vocational school than did urban or suburban youth, but the gap closed by the end of the programs (Table 5).

It is important to understand student perceptions of FANR and to document practices that change any misperceptions that dissuade career interest in FANR. Both programs positively influenced the perceptions

**Table 4. Pre- and post-survey responses of MAP and AIMS participants regarding perceptions of agriculture and natural resources. 2003 – 2008.**  
*Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.*

Perceptions of higher education	Across Programs		MAP		AIMS	
	Pre-Survey N = 207	Post-Survey N = 172	Pre-Survey N = 119	Post-Survey N = 92	Pre-Survey N = 88	Post-Survey N = 80
A job in agriculture or natural resources means working on a farm	3.71	4.16***	3.71	4.30***	3.69	4.01*
It does not take much knowledge/ability to work in agriculture or natural resources	4.01	4.12 NS	3.98	4.27*	4.06	3.94 NS
Actions to protect the environment waste time and money	4.37	4.43 NS	4.34	4.38 NS	4.41	4.49 NS
People in agriculture and natural resource jobs earn less money	3.72	3.98*	3.76	4.11***	3.68	3.84 NS
Agriculture and natural resources are not science based	4.24	4.36 NS	4.27	4.41 NS	4.21	4.29 NS
Managing wildlife is not part of agriculture and natural resources	4.18	4.37*	4.12	4.36*	4.25	4.39 NS
Learning about agriculture and natural resources is boring	3.72	3.92*	3.67	4.00*	3.79	3.82 NS
²Composite score	4.00	4.19***	3.99	4.26***	4.02	4.10 NS

NS, \*, \*\*, \*\*\* Indicates non-significance or significant difference for means between columns across programs or between columns within a program at  $P \leq 0.05$  or  $P \leq 0.001$ , respectively, according to Independent Samples T-test.  
 ²Composite scores were calculated by averaging the mean of all responses in each column.

## Engaging Under-Represented

**Table 5. Pre- and post-survey responses by grade level, type of residential community, and gender. 2003 – 2008.**  
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

"I have the knowledge/ability to attend college or vocational school"				
Grade Level	Pre-Survey		Post-Survey	
	N	Mean	N	Mean
12th	76	1.20 b*	58	1.26 NS
11th	76	1.20 b	63	1.14
10th	48	1.26 b	41	1.12
9th	8	1.75 a	7	1.43
Gender				
Male	77	1.14 b*	58	1.14 b*
Female	130	1.39 a	112	1.28 a
Type of Community				
Urban/City	122	1.98 b**	101	1.71 NS
Suburban/Town	67	2.00 b	58	1.81
Rural/Country	14	2.79 a	11	1.91

NS,\*,\*\*Nonsignificant difference or means followed by different letters indicate significant difference within columns at  $P \leq 0.05$  and  $P \leq 0.01$ , respectively, according to Tukey B.

that under-represented students had about FANR, but MAP had a more pronounced effect than AIMS.

### Parent Perceptions of Food, Agriculture and Natural Resources

Since parents play a major role in a child's selection of a course of study in college (Esters, 2007; Lynch, 2001), the survey sought to explore parental knowledge and attitudes about FANR. Parents expressed a positive attitude (Table 6) towards supporting their child's decision should the child choose to pursue a career in ANR, although they were less certain that their

**Table 6. Perceptions of higher education and of agriculture and natural resources by parents of students in the MAP and AIMS. 2003 – 2008.**  
Likert scale: 1=Strongly Agree, 2 = Agree, 3= Undecided, 4 = Disagree, 5 = Strongly Disagree.

Question	Mean	S.D.
Would support child's decision to pursue career in agriculture or natural resources	1.38	0.61
I am knowledgeable about different academic programs in agriculture and natural resources	2.64	0.98
My child is interested in pursuing a career in agriculture or natural resources	2.48	0.86
The program is more than a camp experience for my child	1.39	0.78
Careers in agriculture offer low paying jobs	3.69	0.84
Careers in natural resources offer low paying jobs	3.71	0.84
There aren't many jobs available in agriculture	3.84	.088
There aren't many jobs available in natural resources	3.84	0.90
Agriculture deals mostly with farming	3.81	0.94
I would refer other parents to this program	1.43	0.77

**Table 7. Examples of parental responses to open-ended pre-survey questions about AIMS and MAP.**

Question: "Why did you choose this program for your child?"		
Year	Program	Response
2004	AIMS	"I had another child participate in the AIMS program. After her week here she decided she wanted to attend college."
2006	MAP	"I was part of this program many years ago. It was a wonderful program and I thought he would get a lot out of this program."
2008	MAP	"We chose this program because my child is dedicated to study of agriculture and natural resources and animal science. Her dream is to attend 'MSU'. She loves this school and what they have to offer."
2008	AIMS	"How she needs to plan better in high school, i.e. classes, grades, test scores and to know what colleges are looking for and what she needs to do."
2008	AIMS	"Highly recommended by a friend."
2008	AIMS	"Loves sciences, animals, wildlife, and wanting exposure to degrees. MAP? next year" (sic)
Question: "What do you expect your child to gain from this program?"		
Year	Program	Response
2006	MAP	"I want her to come out of this experience knowing more about agriculture as well as experiencing how students live and learn at college."
2008	AIMS	"Knowledge in all areas and degree opportunities here at MSU. ACT advancement. Social experience."
2008	MAP	"I expect for him to prepare himself for the ACT exam. I expect for him to learn about different fields in agriculture and natural resources."

children had such an interest. Parents agreed that AIMS and MAP provided more than a "camp" experience, interpreted to mean AIMS and MAP were more than an experience away from home for their children, and parents asserted they would refer other parents to AIMS or MAP. Parents had little knowledge about academic programs in ANR. Parents were undecided about the statements that ANR had low paying jobs, that there were not many jobs in ANR, and that agriculture deals mainly with farming. Given the influence parents have in selection of students' college career choices (Esters, 2007, Lynch 2001, Perna and Titus, 2005), it is crucial to help parents better understand career opportunities in FANR.

Parental comments to open-ended questions were extremely positive for AIMS and MAP (Table 7) and provided excellent information for use in marketing and recruiting students for these programs. Such information is vital as ANR competes, for outstanding students, with other disciplines often considered to be more "prestigious." Comments demonstrated that parents encouraged their children to explore careers in ANR, even though the parents were not familiar with these careers and that parents wanted the college exposure for their children and the opportunity for them to prepare for the ACT test. Future research should ask more specific questions concerning parental perceptions of FANR, inquire where the parents obtained their knowledge about FANR, and inquire about their preferred method of obtaining additional information about FANR if desired. Likewise, future research needs to assess parental attitudes towards higher education, an aspect that was lacking in this study.

The AIMS and MAP incorporated five of the 11 critical components proposed by Perna (2002): students' aspirations to attend college; visits to various CANR and MSU programs, centers, and institutes; promoting rigorous course work in high school; promoting college awareness with regard to admissions and financial aid processes; and providing practice for the ACT exam. Efforts to affect decisions about careers in FANR included multiple exposures to FANR careers and disciplines, close interaction with faculty and/or graduate students, and exploration of parental attitudes about FANR (Cannon et al., 2006; Esters, 2007; Gale, 2002; and Lynch, 2001).

### Summary

Both AIMS and MAP positively affected student perceptions of higher education and FANR, but MAP had a more pronounced effect than AIMS. Students in the shorter-length residential program (AIMS) had an increased knowledge of what it is like to be in college and recognized that careers in FANR are not limited to working on a farm. Students in the six-week residential program (MAP) had an increased understanding of what classes are needed in high school to prepare for college and the process for applying to college, and had a clearer understanding of what it is like to be in college. The MAP participants understood that a career in FANR means more than working on a farm and that a great deal of knowledge and ability are needed to work in FANR. Additionally, MAP participants understood that careers in FANR are not low paying jobs, that wildlife management was part of FANR, and thought that learning about FANR was not boring. Parents were positive in their attitudes towards AIMS and MAP and towards encouraging their children if they were interested in FANR, but parents had limited information about career opportunities in FANR. There is an urgent need to recruit a larger and more diverse pool of students to meet workforce demands in FANR. Results suggest that pre-college programs such as AIMS and MAP have the potential to play an important role in helping to address that need and in promoting higher education for participants from under-represented groups. This held true even in the environment created by Proposal 2, an environment which could have limited the inclusion of under-represented groups. Results also suggest that six-week programs are more effective than one-week programs in accomplishing these goals.

### Recommendations

This research is only one step in an important process to assess the impact that pre-college programs

in FANR may have upon the pursuit of higher education and on the pursuit of careers in FANR by under-represented students. The MAP and AIMS programs have existed long enough to provide excellent data to determine the extent to which their alumni have graduated from post-secondary institutions and/or studied FANR. Future studies should assess the number of AIMS and MAP students, beginning with 1982 participants, who (1) have graduated from majors in the CANR at MSU, (2) have graduated from other majors at MSU, (3) have matriculated at and/or graduated from other post-secondary institutions throughout the nation, (4) have earned graduate or professional degrees, and/or (5) are currently enrolled in post-secondary education. Future work also should compare ACT scores of AIMS and MAP students at the beginning of the summer, end of the respective program, and end of the year-long ACT access period. These additional research components are essential in helping to assess whether these pre-college residential programs have achieved the ultimate goal of recruiting, retaining, and graduating under-represented students in FANR.

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