Professional Agricultural Workers Journal

Volume 5
Number 2 *Professional Agricultural Workers Journal (PAWJ)* 2

3-13-2018

Discovering Agriculture-Related Careers Through Cypress

Audrey McCrary-Quarles
South Carolina State University, amccrar1@scsu.edu

Christopher C. Mathis Jr.
South Carolina State University, cmathis@scsu.edu

Follow this and additional works at: https://tuspubs.tuskegee.edu/pawj

 Part of the Agricultural Economics Commons, and the Education Commons

Recommended Citation
McCrary-Quarles, Audrey and Mathis, Christopher C. Jr. (2018) "Discovering Agriculture-Related Careers Through Cypress," *Professional Agricultural Workers Journal*: Vol. 5: No. 2, 2.
Available at: https://tuspubs.tuskegee.edu/pawj/vol5/iss2/2

This Article is brought to you for free and open access by Tuskegee Scholarly Publications. It has been accepted for inclusion in Professional Agricultural Workers Journal by an authorized editor of Tuskegee Scholarly Publications. For more information, please contact craig@mytu.tuskegee.edu.

DISCOVERING AGRICULTURE-RELATED CAREERS THROUGH CYPRESS

***Audrey McCrary-Quarles[1] and Christopher C. Mathis, Jr[1]**
[1]South Carolina State University, Orangeburg, SC
***Email of lead author: amccrar1@scsu.edu**

Abstract

The primary objective of the Combining Youth Passion and Resources for Environmental Sciences Studies (CYPRESS) Project was to increase awareness and generate interest among minority students regarding agriculture-related careers, in rural SC. The students participated in 4H after-school programs, summer camps, and an Ag-Science course. There were also workshops for teachers and parents for them to support the students. Data from the project were analyzed using pre- and post-survey methods. The results revealed that 26% of 4H after-school participants were interested in pursuing agriculture-related careers; 43% of summer camp participants were interested in pursuing such careers, and 5% of the Ag-Science course participants were interested in pursuing such careers. Despite the low percentage response of the Ag-Science course participants, overall, CYPRESS exposed over 600 students to agriculture-related careers. This is expected to ultimately, have a positive impact on enrollment in agriculture-related majors.

Keywords: Agriculture-Related Careers, Career Model, Career Preparation, 4-H After-School Programs, Minority Students

Introduction

In 2012, a joint venture of the Secretary of Education and the Secretary of Agriculture and Forestry of Virginia initiated a strategic review of the agricultural education in Virginia. The purpose of the review was to examine agricultural and other educational courses to offer to students, taking into consideration current and future workforce needs. During a focus group discussion, many committee members expressed the view that the field of agriculture is misunderstood. A report generated from the issue revealed the following truism about agriculture: "Agriculture is more than just farming; it is part of a global economic network of imports and exports. While it is most certainly farms and crop and animal production, it is also chemical and biological research, bioengineering, genetics, sustainability, energy and alternative energy, environmental science, transportation and logistics, distribution and marketing, global finance and consumer issues – all of which contributes to a viable industry now and in the future" (Virginia Department of Education, 2013, p. 5).

The preceding connotes that there is a lack of agricultural literacy in America because much of the U.S. population do not live on farms or engage in agricultural production. According to the USDA Economic Research Service [ERS] (2017), American agriculture and rural life have transformed. In the past, agricultural labor was rigorous and contained on many small, diversified farms in rural areas, where over half of the U.S. population resided. However, in the 21st Century, agricultural production is being conducted on a small number of large, specialized farms in rural areas, where less than a fourth of the U.S. population lives. Currently, less than one percent of the U.S. labor force works in agricultural production; however, this workforce plays a vital role in the agriculture supply chain (USDA ERS, 2016). This shift in the production structure has contributed to a lack of agricultural knowledge and a decrease in the agricultural

workforce, which has taken place over the decades; hence, the need for agricultural education in today's schools has become critical.

Currently, middle school agriculture educators are enlightening students both in the classroom and the laboratory about new techniques in Agriculture. For instance, with the growing world of biotechnology, a "new agriculture" has emerged. The "new agriculture" offers students exciting new career paths to consider before reaching high school. Also, the reality of having coursework experiences around real animals and plants can be very beneficial for students. The experience tends to provide a unique context for middle-level students to learn the various concepts and skills in mathematics, science, social studies, and communication (Gibbs, 2005). Furthermore, research has supported the need for hands-on, career-oriented, and application-based experiences offered through field stations and marine laboratories. These skills can help increase the number of students considering science, technology, engineering, and mathematics (STEM) disciplines and careers (Gilligan et al., 2007). This type of targeted field training, coupled with K-12 outreach, expands possibilities of building a successful pipeline, not only into the university but also into natural resources and environmental science careers. The above facts gave birth to Combining Youth Passion and Resources for Environmental Science Studies (CYPRESS) in 2011.

Over a five-year period, 2012-2016, the CYPRESS team worked with middle and high students within the Orangeburg Consolidated School District Five area, within rural South Carolina, to enhance their awareness of Agriculture-related careers. Several activities comprise the framework for the "Career Recruitment Model" for minority students, which consists of (1) 4H after-school programs; (2) an Ag-Science course; (3) summer residential camps, and (4) parent/teacher workshops (Figure 1).

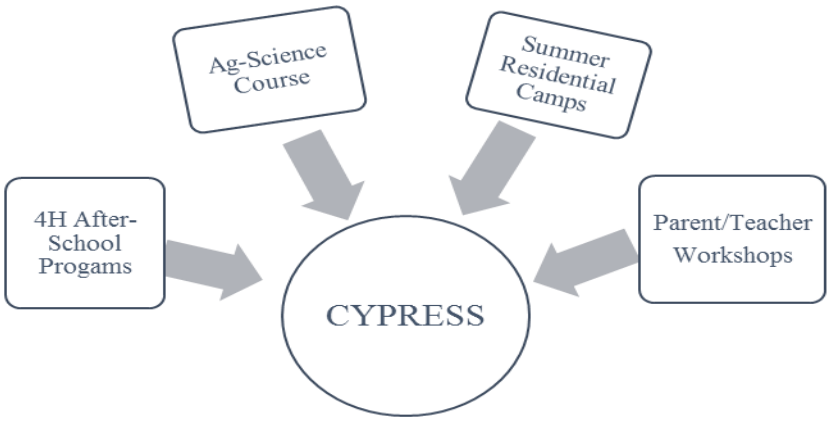

Figure 1. Career Recruitment Model for Minority Youth

The Career Recruitment Model incorporates a seamless pipeline from middle school to high school to support students interested in pursuing agriculture-related careers before going to college. This model includes year-round activities for career awareness, exploration, and preparation for middle and high school students. It also develops a more informed public among teachers and parents regarding college majors and scholarship opportunities within the agricultural field of study. The key is having college-bound students enrolled in the programs.

The overall goal of CYPRESS is to generate interest in various agricultural career fields among minority students. CYPRESS has been proactive in cultivating the next generation of workers to include under-represented groups to solve the agricultural workforce shortage facing the nation. It also provides activities to dispel the myth of agriculture jobs solely relating to "working on the farm," which still exists today among the youth and the public (National Research Council, 2009a). The primary objective of CYPRESS is to increase awareness and generate interest among minority students regarding agriculture-related careers. Also, it aims to develop an informed public regarding agricultural jobs and improve student recruitment to SC State University in agricultural majors. This study provides critical findings of the CYPRESS project.

Literature Review

For some time, academic institutions have been faced with addressing the declining interest among students majoring in agricultural studies (National Research Council, 2009b). Today, many minority youths have pigeonholed agricultural careers to just "working on the farm," limiting their scope of career options for the future. This lack of interest among students can also be attributed to farming practices moving towards large-scale production methods, where the average individual has become further removed from the practice of agriculture. As a result, many high school students gain most of their knowledge of farming in the classroom setting, as opposed to actual farm experiences. This phenomenon supports the need for improving agricultural education in today's schools (Flynn et al., 2014).

In 2008, several organizations came together regarding the state of current biological research efforts and to make recommendations on how to increase advances being made in the scientific community. The organizations included the U.S. National Research Council's Board on Life Sciences, National Institutes of Health, National Science Foundation, and Department of Energy. One significant finding presented by the committee was the need to invest in education in the new biology to fully meet the challenges of the 21st Century. To reach this goal, committee made three key recommendations, namely, that (1) students need highly developed quantitative skills; (2) educators must develop and implement interdisciplinary undergraduate courses and curricula, and (3) policymakers and administrators must design policies and programs that support the development of new curricula by faculty and educators (National Research Council, 2009c).

The National Research Council also suggested partnerships between colleges and universities and K-12 schools. The Council further stated, "Although the specific partnerships will differ from institution to institution, programs that might be considered include agriculture-based high schools, urban agricultural education programs, and summer high-school or youth enrichment programs in agriculture. In addition to formal partnerships and academic programs, colleges and universities should also explore partnerships with youth-focused programs, such as 4-H, National FFA, and scouting programs (National Research Council, 2009c, p. 9). Also, Cassidy (2007) suggested a comprehensive K-12 career development system that would include specific skills for students to support career choices. For example, K-4 grade students would focus on career awareness, while 5-8 graders would engage in career exploration, and 9-12 graders would work on career preparation. By incorporating real-world application and logic into daily learning activities, students will obtain a higher level of career maturity (Cassidy, 2007).

Students commonly tend to choose their majors by being able to identify with someone currently in the field. Most students who take high-level science and math courses in high school do so because of personal perception of academic ability, understanding of the curriculum, identification of a teacher as the most influential person in the student's school experience, and the overall "academic atmosphere" of the school itself (Griffin, 1990). However, Rask and Bailey (2002) stated that one commonly accepted belief is that women and minority students are influenced by women and minority faculty and teachers in a role-model effect. Therefore, if women and minorities are underrepresented in the field, this could hurt future mentorship for directing more minorities into the sciences, which supports the idea that many people are influenced by others who look like them regarding gender and ethnicity.

According to Maton et al. (2000), students revealed that the most contributing factors influencing their success in school were study groups, summer bridge programs, financial support, program staff members, research internships, and mentors. Consequently, Snyder and Jackson (2006) stated that by combining information about various careers in conjunction with the student's interests and needs, the student could begin to make informed, educated, and well-planned decisions about the career they wish to pursue. The research conducted by Rao et al. (2007), implied that few universities offer training for students to practice communicating the scientific knowledge acquired, a skill well sought after by employers. Thus, by getting undergraduates involved in K-12 outreach programs, students have an opportunity to communicate scientific knowledge to non-discipline audiences. This awareness exposure can have an impact on the local community and make science attractive to younger audiences.

In general, a systematic approach to career development can be very effective by including three components, specifically, career exposure, pre-career exploration, and career preparation (Cassidy, 2007). Integrating this type of K-12 curriculum with a summer experience has the potential to generate keen interest in targeted the science disciplines. Baker (2000) believed that nurturing scientific inquiry should begin as early as grade school, including providing summer programs that incorporate hands-on activities, to give students an idea of what it is like to be a scientist. Many programs have been effectively offering internships that attract students at the undergraduate level; however, only a handful focus on recruiting K-12 minority students. Therefore, it is a necessity to incorporate outreach programs to attract the interest of minority students, especially middle and high school students, to various career options.

Methodology

Overall Program Design

CYPRESS addressed the growing need for diversifying the agricultural workforce by focusing on career awareness, exploration, and preparation among middle and high school students. Various activities, specifically, 4H after-school programs, summer camps, an Ag-Science course, and parent/teacher workshops, 2012-2016, were designed and implemented to increase awareness and generate interest among students participating in the program. The 4H after-school programs were intended to provide an overview of various careers associated with gardening, sustainable agriculture, natural science, nutrition, environmental science, and technology. The 4H programs consisted of students from Orangeburg Consolidated School District Five and Felton Laboratory School. The summer camps comprised many of the students from the 4H programs. These students had a chance to explore different careers and engage in

hands-on activities while traveling to various agricultural sites in South Carolina and Georgia. Also, the students stayed on campus for one week to experience college life and dormitory living.

The Ag-Science course was taught to high school students attending the Orangeburg-Wilkerson Technology Center. This course was aligned with an effective Ag curriculum that exposed students to various career tracks within the agricultural field, in addition to college preparation and basic life skills. The course was designed for students who were interested in agriculture and planned to attend college. The parent/teacher workshops provided participants with ideas and resources on how to incorporate agriculture-related careers into the classroom or how to support students who are interested in pursuing careers in the agricultural field. Table 1 illustrates these activities, the target audience, and the number of participants for each event/workshop.

Table 1. CYPRESS Program Activities

Activities	Target Audience	Number of Participants
4H After-School Programs	Middle School Students	324
Summer Camps	Middle School Students	181
Ag-Science Course	High School Students	131
Teacher Workshops	Teachers/Individuals Working with Children	20
Parent Workshops	Middle School Parents	82

Program Delivery, Data Collection, and Analysis

There were five participating middle schools, namely, Howard, Clark, North, Bowman, and Felton Laboratory Charter School, involved in the 4H after-school programs. Thirty to fifty-minute sessions were conducted twice a month with students. A variety of lesson plans were developed to cover topics, such as soil testing, crop development, product marketing, healthy eating, honey production, effective communication, marine biology, animal science, and animal genetics. Following each lesson, two to three undergraduate and graduate students (majoring in agriculture-related fields) from South Carolina State University, engaged students in hands-on activities relating to various careers (i.e., Dietetics/Nutrition, Beekeeping, Animal Science, Veterinary Medicine, and Agribusiness).

Pre- and post-surveys were conducted with the 4H after-school participants to determine the program's effectiveness in increasing awareness and generating interest in pursuing agriculture-related careers. The pre- and post-surveys were identical and consisted of ten questions, which included general demographical information (gender, race, school, grade, etc.) and questions about the program (career interest, college plans, major, etc.). Pre-surveys were completed and

collected in the fall of each year, and post-surveys were completed during the spring. Out of 324 participants, 80 students completed both the pre- and post-surveys.

The summer camps were held for two weeks at a time: the first week was for new students and the second week was for students who had attended the camp previously (returning students). Students were exposed to college life, leadership development exercises, team building activities, healthy eating tips, and physical activity. Also, students traveled to several agricultural establishments in South Carolina and Georgia on daily field trips. These trips highlighted different Agriculture majors, which allowed students to engage in hands-on activities. Field trips included farms (i.e., Bare Foot Farm, Adrian's Goat Farm, and Swine Farm); horticulture and state parks (i.e., Magnolia's Gardens, Biedler Forest, Boone Hall Plantation, Edisto Gardens, and Sesquicentennial State Park); and science studies (i.e., Clemson's Diagnostic Center, Fish Hatchery, Department of Public Utilities, and Department of Natural Resources).

In addition, students explored agribusinesses (i.e., Farmer's Market and Rawl's Farm, Inc.); animal science, natural science and environmental science (i.e., Birds of Prey, Poole Training Center, Bee City, Wildlife Turkey Federation, and Zoo); and marine biology (i.e., Caw-Caw Interpretive Center and South Carolina Aquarium). Tour guides provided critical information to students regarding career preparation and job requirements, such as majors, coursework, and internships. In this case, the Team conducted post-evaluations with the students participating in the summer camps. The post-evaluation consisted of ten questions, which included general demographical information and questions about the program, such as career interest and college plans; 181 students completed the post-survey.

The Ag-Science course was taught to high school students at the Orangeburg-Wilkerson Technology Center. The topics included college preparation and exploration; agriculture overview; soil preparation and crop production; Ag mechanics; biotechnology; environmental issues; Agribusiness; Ag-Science careers; greenhouse effect; pesticides; fertilization, and basic life lessons for youth. A post-evaluation tool was utilized to collect data from participating students. The post-evaluation consisted of ten questions, which included general demographical information and questions about the program, such as career interest and college plans; 131 students completed the post-survey.

The CYPRESS Team conducted two types of workshops: (1) teacher workshops and (2) parent workshops. The teacher workshops were designed to attract K5 through 12-grade educators and individuals who are currently working with children. The purpose was to equip teachers with the necessary resources to enhance knowledge of agriculture, as well as incorporate agricultural topics and careers into the classroom. Various speakers shared lesson plans, software tools, training opportunities, etc. to promote the importance of agriculture as an option for students. Overall, three workshops were conducted with 20 participants. Two of the 20 participants were teachers from the school system. However, all individuals worked with children through various after-school programs and summer camps.

The parent workshops were developed to provide information and resources for family members to support students who wanted to pursue a major in agriculture while in college. Also, information was shared with parents regarding various careers, scholarship, and internship

opportunities. Overall, five workshops were conducted with 82 participants. A post-program evaluation was completed by participants attending the workshops to determine its effectiveness. The authors used SPSS software to input and analyze the data. The results were then summarized by descriptive statistics (frequencies and percentages), separately for the various activities, 4H after-school programs, summer camps, the Ag-Science course, and the teacher/parent workshops.

Results and Discussion

Table 2 shows responses from participants in 4H after-school activities. In the pre-survey, 31% expressed interest in pursuing agriculture-related careers compared to 26% in the post-survey; 69% of participants in the pre-survey indicated that they were aware of the different jobs or majors in agriculture compared to 80% in the post-survey. Also, 64% of participants in the pre-survey indicated that they would like more information on agriculture-related careers as opposed to 66% in the post-survey; 84% of pre-survey participants indicated that they planned to attend college whereas 79% of post-survey participants indicated that they planned to attend college.

Table 2. Responses from Participants in 4H After-School Activities (N = 80)

Variable	Pre-Survey		Post-Survey	
	Frequency	Percent	Frequency	Percent
Interested in Pursuing Ag Career?				
Yes	25	31	21	26
No	23	29	22	28
Undecided	32	40	37	46
Aware of Different Jobs/Related Majors				
Yes	55	69	64	80
No	16	20	10	13
Undecided	9	11	6	7
Like More Information?				
Yes	51	64	53	66
No	8	10	11	14
Undecided	21	26	16	20
Plan to Attend College?				
Yes	67	84	63	79
No	4	5	5	6
Undecided	9	11	12	15

Overall, there was a decrease of five percentage points among participants regarding both interests in pursuing agriculture careers and plans to attend college. These reductions may be attributed to students not being able to attend all sessions due to the commitment to other after-school activities, or students finding out that agriculture may not be the best fit for them. However, there was an increase of 11 percentage points among students about the awareness of different jobs or related majors in agriculture, and two percentage points increase in students wanting more information on agriculture-related majors. The results revealed that the lesson plans were effective in exposing the students to various careers and majors relating to agriculture. Also, the lesson plans seemed to spark some interest among a few participants to seek additional information. However, the basic information covered regarding career paths did

not allow for in-depth discussions due to uncontrollable time restraints. Most of the participating schools allowed the CYPRESS team approximately 45 minutes to visit with the students after school, while other schools preferred the team to visit during school hours for 30 minutes. Therefore, it is understandable why a few of the students may desire more information regarding agriculture-related careers. During the annual summer camps, however, students received an in-depth exposure to the agriculture field.

Table 3 shows responses from summer camp participants. About 43% of participants expressed interest in pursuing agriculture-related careers; 33% were not interested in such careers, and 24% were undecided. This notwithstanding, 98% indicated they planned to attend college; whereas only two percent were undecided. Since 24% of the students were undecided about pursuing agriculture-related careers, it will be beneficial to target these students closely to explore such careers. This process has indirectly started as all students were engaged in activities that provided a closer look at various jobs, educational requirements, and work ethics needed in agriculture-related careers. In fact, the research team also realized that many of the students were exposed to agriculture-related careers for the first time during the summer camps. Even if not all the students who participated in the summer camps pursue agriculture-related careers, the intent is to interest most of them, or at least, a sizeable majority.

Table 3. Responses from Summer Camp Participants (N = 181)

Variable	Post-Survey	
	Frequency	Percent
Interested in Pursuing Ag Career?		
Yes	78	43
No	60	33
Undecided	43	24
Plan to Attend College?		
Yes	177	98
Undecided	4	2

Table 4 presents the responses from high school students enrolled in the Ag-Science course. Only five percent of the students were interested in pursuing agriculture-related careers, and 90% were not interested in pursuing such careers; 54% indicated that they planned to attend college and 46% did not plan to go to college or were undecided. Even after marketing the Ag-Science course during the second year of the project, the proportion of students interested in the Ag-career track continued to decline. A key observation was that the pipeline to support students interested in pursuing agriculture-related careers from middle to high school had been established, the support from school administrators was lacking. In fact, most students who previously enrolled in the 4H program and summer camps were still interested in pursuing agriculture-related careers. However, these students could not enroll in the Ag-Science course in high school, because of other course requirements. Therefore, the Ag-Science course became a dumping ground for students without a first-period class and had little interest in agriculture.

Table 4. Responses from Students Enrolled in the Ag-Science Course (N =131)

Variable	Post-Survey	
	Frequency	Percent
Interested in Pursuing Ag Career?		
Yes	6	5
No	119	90
Undecided	6	5
Plan to Attend College?		
Yes	71	54
No	36	28
Undecided	24	18

Nonetheless, the team continued to expose students who were enrolled in the Course to agriculture-related careers via lectures, activities, and guest speakers, in addition to assisting students with college preparation, leadership skills, and basic life skills. Even though the overall number of students interested in agriculture-related careers was low, four high school seniors from the Ag-Science course are attending college. Two of the four are currently majoring in Agribusiness at SC State University; one student is majoring in Agriculture at another college~~;~~,, and one other student is at another college with an unknown major.

Table 5 reflects responses from teachers and parents who participated in workshops. The results of the two groups were identical. Specifically, all the teacher participants agreed that the sessions were informative; 95% agreed that their knowledge of agriculture-related careers increased, and all agreed that they learned about agricultural scholarships and internships. Similarly, all the parent participants agreed that the workshops were informative; 96% agreed that their knowledge of agriculture-related careers increased, and all agreed that they learned about agricultural scholarships and internships. Ultimately, then, the workshops were successful in providing the requisite information to teachers and parents that attended the sessions.

An additional result or outcome of the activities or programs mentioned above is that both undergraduate and graduate students were exposed to agriculture-related careers. Also, these students gained leadership and mentoring experience by assisting with the 4H programs and summer camps. Four of the undergraduate students who worked with CYPRESS received degrees in nutrition, agribusiness, and physical activity management (parks and recreation). Two graduate students earned master's degrees in agribusiness; one student is still pursuing a graduate degree in agriculture.

Table 5. Responses from Teachers and Parents who Participated in Workshops

Variable	Post-Evaluation	
	Frequency	Percent
Teacher Workshops		
Was Informative?		
Agree	20	100
Knowledge of Agriculture & Careers Increased?		
Agree	19	95
Disagree	0	0
Neutral	1	5
Learned About Scholarships & Internship?		
Agree	20	100
Parent Workshops		
Was Informative?		
Agree	82	100
Knowledge of Agriculture & Careers Increased?		
Agree	79	96
Disagree	0	0
Neutral	3	4
Learned About Scholarships & Internship?		
Agree	82	100

Conclusion

The primary objective of CYPRESS was to increase awareness and generate interest among minority students regarding agriculture-related careers. Overall, 324 middle school students participated in the 4H after-school programs; 181 middle school students participated in the summer camps; 131 high school students took the Ag-Science course; 20 teachers participated in the teacher workshops, and 82 parents participated in the parent workshops. For the 4H after-school programs post-survey, 26% of students were interested in agriculture-related careers and 79% planned to attend college. For the summer camps, 43% of participants were interested in pursuing agriculture-related careers and 98% planned to attend college; for those who took the Ag-Science course, only five percent were interested in pursuing agriculture-related careers and 54% planned to attend college, and for teachers and parents who participated in workshops, at least, 95% found the workshops informative.

In summary, over 600 middle and high school students were exposed to various agriculture-related careers via 4H after-school programs, summer camps, an Ag-Science course, and teacher and parent workshops. Though the Ag-Science course was not that effective, yet, it can become a useful tool for recruitment and support once the right students are filtered into the class. Also, it is good that teachers and parents are involved in the process, because of their influence on students. Moreover, it is an appropriate strategy that upperclassmen in agricultural majors are involved in mentoring the middle and high school students because they have a "more direct

influence" on them as it relates to pursuing agriculture-related careers. Overall, these efforts are expected to have a positive impact on enrollment in agriculture-related majors. Future research is suggested. This research could include, but not limited to, first, ensuring that all students enrolled in the Ag-science course are on the college track and have some interest in agriculture, and second, expanding the study to include other school districts in rural South Carolina.

Acknowledgement

The CYPRESS project was funded by USDA National Institute of Food and Agriculture, 1890 Capacity Building Grants Program, Grant Award #2014-38821-22400. Additional support was given by the Department of Health Sciences, 1890 Research and Extension Programs, and Office of Sponsored Programs, South Carolina State University. Special thanks are extended to the administration, guidance counselors, teachers, staff, and students of Orangeburg Consolidation School District Five (Middle Schools - Howard, Clark, North, Bowman, and Felton Laboratory Charter), and Orangeburg-Wilkerson Technology Center. Finally, the authors are grateful to the many parents, bus drivers, and CYPRESS team for making it all possible.

References

Virginia Department of Education. (2013). "A Strategic Review of Agriculture Education: Preparing Students for Successful Transition to College and Careers." www.doe.virginia.gov/ instruction/career_technical/agriculture/agriculture_education_report.pdf [Retrieved August 20, 2017].

Baker, B. (2000). "Recruiting Minorities to the Biological Sciences." *Bioscience* 50 (3): 191-195.

Cassidy, R. A. (2007). "The Benefits of a Comprehensive K-12 Career Development System." *Techniques* 82 (4): 44.

Flynn, K., J. Popp, S. Hausmann, S., and J. Whisenhunt. (2014). "Gender Differences in Consumption and Perception of Local Produce among High School Students." *NACTA Journal* 58 (4): 317-323.

Gibbs, Hope J. (2005). "Agriculture Education in Middle School." *Techniques: Connecting Education &Careers* 80 (2): 28-33.

Gilligan, M. R., P. G. Verity, C. B. Cook, S. B. Cook, M. G. Booth, and M. E. Frischer. (2007). "Building a Diverse and Innovative Ocean Workforce through Collaboration and Partnerships that Integrate Research and Education: HBCUs and Marine Laboratories." *Journal of Geosciences Education* 55 (6): 531-540.

Griffin, J. B. (1990). "Developing More Minority Mathematicians and Scientists: A New Approach." *Journal of Negro Education* 59 (3): 424-438.

Maton, K., F. I. Hrabowski, and C. Schmitt. (2000). "African America College Students Excelling in the Sciences: College and Post College Outcomes in the Meyerhof Scholars Program." *Journal of Research in Science Teaching* 37 (7): 629-654.

National Research Council (2009a). "Transforming Agricultural Education for a Changing World." Committee on a Leadership Summit to Effect Change in Teaching and Learning. Washington, DC: The National Academies Press.

National Research Council (2009b). "Transforming Agricultural Education for a Changing World." Washington, DC: The National Academies Press.

National Research Council (2009c). "A New Biology for the 21st Century." Committee on a New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution. Washington, DC: The National Academies Press.

Rao, S., D. Shamah, and R. Collay. (2007). "Meaningful Involvement of Science Undergraduates in K-12 Outreach." *Journal of College Science Teaching* 36 (6): 54.

Rask, K. N., and E. M. Bailey. (2002). "Are Faculty Role Models? Evidence from Major Choice in an Undergraduate Institution." *The Journal of Economic Education* 33 (2): 99-124.

Seed, A. H. (2008). "Cohort Building through Experiential Learning." *Journal of Experiential Education* 31 (2): 209-224.

Snyder, D., and S. Jackson. (2006). "Systematic, Systemic and Motivating: The K-12 Career Development Process." *Techniques* 81 (3): 22.

USDA ERS. (2017). "Farming and Farming Income." https://www.ers.usda.gov/data-products/ag-and-food-statistics-charting-the-essentials/farming-and-farm-income/ [Retrieved April 8, 2017].

USDA ERS. (2016). "Farm Labor." https://www.ers.usda.gov/topics/farm-economy/farm-labor/ [Retrieved April 8, 2017].