Optimizing the Food and Agricultural Workforce: A Summer Research Experience Program for Community College Students

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Idea

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Introduction/Need

The United States is currently experiencing incongruity between workforce skills needed among graduates and formal education curricula. Research has shown that college graduates in food and agriculture need greater soft skills (often referred to as 21st century skills): critical thinking, strategic planning, teamwork, communication, leadership, problem-solving, self-management, and professionalism (Crawford, Lang, Fink, Dalton, & Fielitz, 2011; Easterly, Warner, Myers, Lamm, & Telg, 2017; National Research Council, 2012; Stripling & Ricketts, 2016). Community college serves many first-generation, low-income, and otherwise traditionally underrepresented college students. In fact, students who attend community college have a 23% increased probability of earning a bachelor's degree (Denning, 2017). Unfortunately, community college students often lack opportunities that support experiential learning, deeper learning, and 21st century skills, such as conducting undergraduate research. Undergraduate research, a key for a highly skilled workforce, provides leadership skill development that is paramount to STEM careers (Sadler, Burgin, McKinney, & Ponjuan, 2010).

To address the needs for food and agricultural workforce development and greater equity, access, and opportunity among community college students, the REACH program was created. REACH is an 8-week, summer residential program at the University of Tennessee, Knoxville for undergraduates from Tennessee's 13 community colleges (2-year programs leading to an Associate's Degree). Students who have completed at least two community college STEM-based classes and laboratories are actively recruited. Selection prioritizes students who are: (a) economically disadvantaged (based on Pell grant-eligibility); (b) represent racial and/or ethnic minority groups; and (c) first-generation college students. REACH provides participants, referred to as REACH Scholars, the opportunity to develop valuable research abilities, to gain 21st Century skills, and to learn about careers in food and agriculture.

How it works

In summer 2019, eight REACH Scholars engaged in research activities, career development, and 21st Century skills development. While this program was conducted in 2018, the 2019 version applied the lessons learned from the previous year, including the need for peer mentors to provide support and advice to the REACH Scholars. REACH Scholars received applicable compliance training and laboratory-specific operating procedures. They spent approximately 30 hours per week in the research laboratory with the faculty mentor, assigned post-docs, and/or assigned graduate students. To gain career-ready skills, REACH Scholars participated in intensive weekly workshops to develop 21st Century skills, including the *Clifton StrengthsFinder* instrument. In individual coaching sessions with each scholar, one faculty member helped each REACH Scholar to learn about how to use their strengths in educational and career settings, to inform career choices, and to work in teams.

The REACH Program was evaluated through a mixed-methods research design that integrates selected quantitative and qualitative data collection to assess and monitor the program milestones, outcomes, and indicators (Rossi 2004, Owen 1999, Rockwell, 2004). The eight REACH Scholars completed four different assessments. Student Assessment of their Learning

Gains (SALG) questionnaire (Seymour 2000) measured the effectiveness of student research activities. The SALG questionnaire includes a scale that measures thinking and working like a scientist. The Likert-type responses are 1 (*no gains*), 2 (*a little gain*), 3 (*moderate gain*), 4 (*good gain*), and 5 (*great gain*). A retrospective post-then-pre questionnaire ascertained 21st Century Skills development. A post-program questionnaire that measured the likelihood to enter an agricultural career, perceptions of agricultural occupations, and entry requirements was administered (Talbert & Larker, 1995). Pre-program and post-program focus groups were conducted to understand the program *in summa*.

Results to date

REACH Scholars developed research abilities. For each item on the SALG thinking and working like a scientist scale, the vast majority of REACH Scholars (n=8) reported good or great gains: (a) 100% reported good or great gains for problem-solving in general; (b) 87.5% reported good or great gains for identifying limitations of research methods and designs; and (c) 87.5% reported good or great gains for understanding theories and concepts guiding my research project.

REACH S*cholars enhanced career development*. In the pre-program interview, 37.5% of [NAME] Scholars reported they planned to pursue a MS and/or PhD in a STEM field (i.e. chemistry, mechanical engineering, and plant pathology). At post-program, the SALG showed 100% plan to pursue a Master of Science degree and 50% plan to pursue a doctorate in a STEM field (i.e., bioinformatics, food science, medicine, and plant pathology).

REACH Scholars developed 21st Century skills. They reported gains in (a) selecting appropriate mentors and acceptance of advice, (b) identifying and analyzing problems, (c) seeing the "big picture" and thinking strategically, (d) maintaining accountability to the team; and (e) efficient and effective work habits.

Future plans/advice to others

REACH 2019 was Year 2 of a three-year USDA-funded program. Based on these Year 2 results, we recommend that the program continue for Year 3 and that faculty examine ways to institutionalize the program beyond the initial grant. The evaluation provided a rich data set, and we suggest that the same data be collected in Year 3 to examine the project's total impact. It is recommended that faculty, graduate students, and/or post-doc mentors receive professional development in mentoring to enhance the experience for REACH Scholars.

Costs/resources needed

REACH was designed to serve approximately 30 community college students over three years. Each REACH Scholar received a $4800 educational stipend and a $500 travel allowance. In addition, the budget includes on-campus food and housing for each REACH Scholar, lab supplies, and travel to agricultural experiment stations and industries. Faculty, graduate student, and/or post-doc mentors are essential, and they must have the time to provide individual mentoring. This work was supported by Food, Agriculture, Natural Resources and Human Sciences Education and Literacy Initiative Grant no. 2018-67032-27703 from the USDA National Institute of Food and Agriculture.

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