

**Evaluation of a Three Year, Multidisciplinary Food and Agricultural Workforce
Development Program for High School Counselors and STEM Educators**

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Introduction

High school student exposure to agricultural education is rapidly diminishing, negatively influencing their pursuit of food system careers and generating a concerning decline in the workforce (Charoenmuang et al., 2024; Cosby et al., 2024; Hendrix et al., 2021; Ingram & Keshwani, 2020). To address these workforce challenges, [University] faculty and researchers developed a three year, multidisciplinary, cohort based workforce development program called [University's] Summer Food Science, Urban Agriculture, and Nutrition (FUN) program. Each cohort participated in four weeks of immersive, experiential, and reflective learning developed by expert faculty to expose, excite, and inform participants about various careers and educational pathways within the agri-food sector, and by extension, enhance career communication with students. The purpose of this study was to assess program capacity to increase self-perceived career knowledge, career awareness, and confidence communicating careers in food science, nutrition, and urban agriculture among recruited urban high school counselors and science, technology, engineering, and mathematics (STEM) teachers. Integrating agricultural concepts into traditional school day settings and general STEM classrooms may provide career exposure opportunities that are critical for positively influencing youth career interest in agricultural and related professions (Cosby et al., 2022).

Conceptual Framework

Mezirow's (1997) theory of Transformative Learning suggests that adult learners can undergo transformative learning by critically reflecting on the assumptions upon which their beliefs, habits or views are based. Educators need to actively engage learners by presenting concepts that are relevant to their lives, and their role is one of a facilitator who models critical reflection. In the context of the [University's] Summer FUN program, counselors and STEM educators were asked to reflect on their program experience and translate their learning around food sciences, nutrition, and urban agriculture into existing STEM pedagogical activities or to introducing high school students to career opportunities in these fields.

Methods

Sixty-one STEM teachers and counselors participated in cohorts across three years of program implementation from 2023-2025. Pre and post surveys were administered each programming year to measure changes in self-perceived knowledge, career awareness, and confidence communicating careers in food science, nutrition, and agriculture. Paired-sample t test analyses was conducted separately for each cohort year (2023-2025) using SPSS (version 31) to examine pre-post changes in knowledge, awareness, and confidence. An alpha level of .05 was used for all statistical tests.

Results

Participants demonstrated consistent, statistically significant improvements in post program scores of knowledge, awareness, and confidence following program participation across all cohorts from programming years 2023-2025 (Table 1). Effect sizes were large to very large (Cohen's $d_z = 1.45-3.15$), indicating meaningful and consistent program impact across cohorts.

Table 1

Changes in Mean Pre and Post Survey Scores By Outcome For All Cohorts Years (2023-2025)

Cohort 1 (Year 2023)						
Outcome	Pre		Post		Mean Difference	Cohen's <i>d</i> _z
	M	SD	M	SD		
Total Scale	62.73	10.91	106.27	14.38	43.53**	2.14
Knowledge	22.67	4.85	35.73	3.68	13.07**	1.91
Awareness	33.56	6.40	53.69	6.11	20.13**	1.75
Confidence	6.88	1.78	16.25	1.84	9.38**	2.69
Cohort 2 (Year 2024)						
Outcome	Pre		Post		Mean Difference	Cohen's <i>d</i> _z
	M	SD	M	SD		
Total Scale	65.26	10.35	101.39	13.47	36.13**	3.12
Knowledge	23.70	4.67	34.65	3.52	10.96**	2.30
Awareness	34.04	6.01	50.74	5.92	16.70**	2.52
Confidence	7.52	1.63	16.00	1.72	8.48**	3.15
Cohort 3 (Year 2025)						
Outcome	Pre		Post		Mean Difference	Cohen's <i>d</i> _z
	M	SD	M	SD		
Total Scale	65.57	11.08	105.38	15.01	39.81**	1.97
Knowledge	24.23	4.94	35.55	3.80	11.32**	1.98
Awareness	33.43	6.55	53.29	6.30	19.86**	1.70
Confidence	8.23	1.92	16.05	1.87	7.82**	1.45

Note. M = mean; SD = standard deviation; aCohen's *d*_z represents the effect size for paired designs with sizes of 1.3 and above being considered very large (Sullivan & Feinn, 2012).

***p* < .001, two-tailed

Conclusions/Implications

The purpose of this study was to examine the effectiveness of an agricultural workforce development program for urban high school STEM teachers and counselors. The results suggest that the [University's] Summer FUN program was strongly and consistently effective at increasing educators' and counselors' self-perceived knowledge, awareness, and confidence communicating careers across the food system. Advancing general teacher and counselor knowledge of agricultural science topics and careers may generate positive youth interest in agricultural and related professions, and serve as the foundation of an innovative workforce development model.

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