

**Evaluation of Pilot STEM Career Symposium  
for Minority-Serving Institutions' Youth**

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### Introduction

Minority-Serving Institutions (MSIs) support underrepresented minority (URM) students' academic and professional growth, especially in STEM fields. Institutions like Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Institutions (HSIs) have successfully fostered culturally responsive learning environments that address URM students' unique challenges (Gándara & Contreras, 2009; Gasman, 2013). This evaluation study adds to the ongoing discussion on the significance of culturally tailored interventions in higher education, particularly within MSIs.

### Conceptual/Theoretical Framework

Historically Black Colleges and Universities (HBCUs) and Hispanic-Serving Institutions (HSIs) integrate tailored curricula and support systems that foster a sense of belonging, significantly improving URM student outcomes (Gasman, 2013; Perna et al., 2009). As a result, MSIs consistently produce a higher percentage of graduates pursuing advanced degrees and STEM careers than PWIs (Palmer et al., 2011), reinforcing their critical role in advancing equity in higher education. Studies show that the Theory of Planned Behavior-based interventions effectively increase students' intent to pursue higher education, particularly when they address specific barriers such as financial constraints and lack of mentorship (Armitage & Conner, 2001; Conner & Sparks, 2005). By integrating institutional support with behavioral theory, MSIs can maximize the impact of career interventions, ensuring URM students have the tools to achieve their academic and professional goals. The effectiveness of educational interventions, particularly those grounded in TPB, must be rigorously evaluated to understand their impact and identify areas for improvement. In the context of MSIs, where the stakes for URM students are high, evaluations must assess the immediate outcomes of interventions and consider their long-term effects on students' academic and career trajectories (Kirkpatrick & Kirkpatrick, 2006). This study evaluated the career symposium by assessing changes in students' knowledge, skills, perceptions of barriers, and career decision-making before and after the intervention, focusing on how these changes differed across various demographic groups.

### Purpose and Research Objective

The research team developed a STEM in Ag career symposium for prospective graduate students in agriculture and entomology. This pilot study assessed its impact on participants' STEM careers and graduate education readiness, including their experience with the recorded virtual symposium. Approved by the Institutional Review Board, the study aimed to (1) evaluate readiness before and after the symposium and (2) examine the relationship between readiness domains and participant demographics.

### Method

The career symposium was designed using a logic model framework, incorporating inputs, outputs, and outcomes to assess its impact on STEM graduate education and career readiness in agriculture and entomology (Workman & Scheer, 2012). Presentations highlighted career pathways, faculty insights on program requirements, and essential technical and soft skills for STEM careers. A panel of faculty experts validated the survey instrument, with all scales demonstrating reliability above .70. We used a four-scale instrument to evaluate the program. The Knowledge of Pursuing Graduate Education Scale, adopted from Adedokun et al. (2013),

had a Cronbach's alpha of .92. The Career Path Decision Scale, adapted from Lexis et al. (2021), had a reliability of .76. Two additional scales, developed based on literature, measured Understanding the Importance of Technical and Soft Skills in STEM Careers (.94) and Understanding Barriers to Pursuing Graduate Education. The recorded symposium was distributed to expand participation, and a QR code survey was provided with a \$25 incentive, resulting in 41 usable responses from 56 submissions. Demographic data included age, gender, race/ethnicity, major, and family educational background.

### **Results/Findings**

The symposium significantly improved URM students' knowledge of graduate education (Cohen's  $d = 0.743$ ) and understanding of technical and soft skills (Cohen's  $d = 0.962$ ). However, the increase in understanding barriers to graduate education was minimal (Cohen's  $d = 0.040$ ), suggesting a need for more targeted content on overcoming financial, cultural, and institutional challenges. Career path decision-making showed moderate gains (Cohen's  $d = 0.578$ ), indicating increased confidence but highlighting the need for ongoing support. Paired samples t-tests confirmed statistically significant improvements in knowledge and skills, reinforcing the symposium's effectiveness in preparing students for STEM careers and graduate education. We used chi-square analysis to examine how demographic variables influenced students' STEM careers and graduate education readiness after the virtual symposium. Age was significantly related to knowledge of pursuing graduate education ( $X^2 = 12.45$ ,  $p = 0.035$ ), with older students showing greater knowledge gains. Gender significantly influenced career path decisions ( $X^2 = 9.69$ ,  $p = 0.002$ ), with female students benefiting more. Ethnicity did not significantly affect knowledge or skills acquisition. However, it showed a near-significant relationship with understanding barriers to graduate education ( $X^2 = 5.34$ ,  $p = 0.369$ ), highlighting the need for tailored interventions based on ethnic differences.

### **Implications and Recommendations**

**Insights for Researchers.** This study highlights the importance of targeted support for URM students in graduate education. Culturally relevant programs at Minority-Serving Institutions (MSIs) improve students' knowledge, but further research is needed on bridging resource gaps at Predominantly White Institutions (PWIs) (Gándara & Contreras, 2009; Palmer et al., 2011). The symposium's limited impact on understanding barriers suggests a need for more focused interventions addressing financial and institutional challenges (Whittaker & Montgomery, 2012). Additionally, demographic differences in knowledge gains indicate that interventions should be tailored based on age, gender, and ethnicity (Jehangir et al., 2022).

**Practical Applications for Institutions.** The symposium significantly enhanced technical and soft skills (Cohen's  $d = 0.962$ ), reinforcing the value of programs integrating STEM training with leadership and communication skills (Fouad & Santana, 2017). Institutions should expand mentorship programs, financial literacy workshops, and culturally responsive initiatives to better support URM students in overcoming systemic barriers (Harper, 2012). Creating inclusive learning environments with role models and sustained institutional support is essential for URM student retention and success in STEM (Garibay & Vincent, 2018). Long-term research on career symposium impacts will help refine these programs, ensuring continued improvements in URM graduate education and career outcomes (Estrada et al., 2018; White et al., 2023).

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