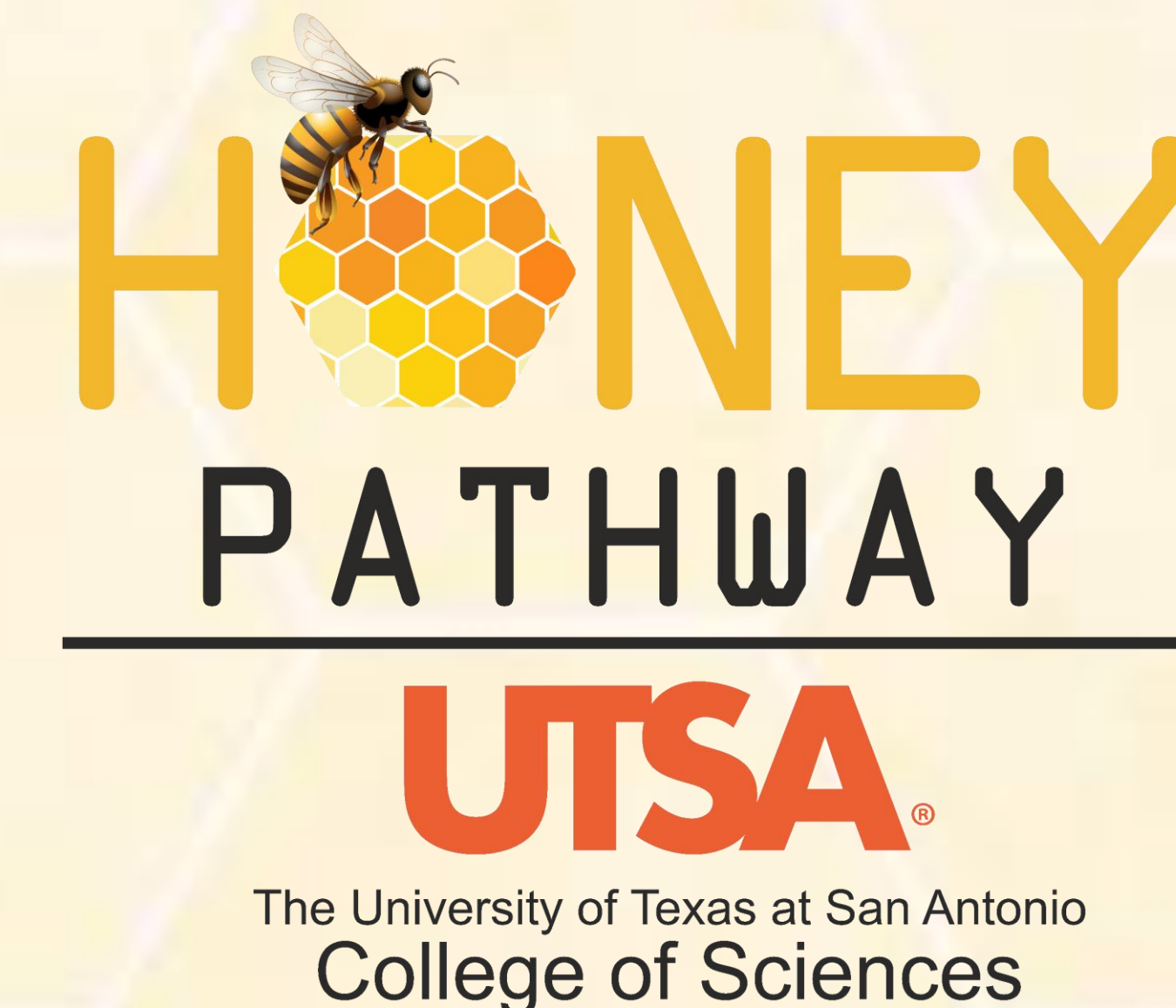




Supporting Science Identity for Underserved and Minoritized Undergraduate Students through Applied Research and Experiential Learning

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Abstract

The HONEY Pathway provides a range of programming which supports students and K-12 faculty in developing research and entrepreneurial expertise in honeybee biology, beekeeping and pollinator research. HONEY Pathway seeks to cultivate professional success and leadership in the next generation of environmental science and biology professionals. The training and opportunities provided through our diverse programs support students in becoming engaged professionals who are: Effective communicators, Well versed in research methods, and Capable of addressing pressing societal challenges like climate change, rural prosperity, nutrition insecurity, supply chain resilience, natural resource conservation, and agricultural biosecurity.

Introduction

The HONEY Pathway program operates in collaboration with academic and industry partners who assist in coordinating professional and experiential research opportunities which cultivate acquisition of applied technical, leadership, and professional skills, with the goal of constructing a transferable and scalable curriculum model—including learning materials, outreach, recruitment, mentoring, retention, and branding strategies—to attract and retain URM students in food, agriculture, natural science and health majors and career paths and support a STEM educational pathways from K-12 through higher education.

Why bees?

Honeybees and pollinators are central to addressing many environmental crises, and likewise face serious challenges due to climate change, including habitat loss and low biosecurity for contagious diseases, both of which are exacerbated by decreasing number of communities educated about and engaged in beekeeping (McGregor, 2009). Additionally, there are only a handful of beekeeping programs established within the higher education institutions in urban locations or within Minority Serving Institutions (MSIs) in the U.S. (Univ. Beekeeping Programs, ND). The lack of access to this specific area of essential pollinator research mirrors larger disparities in representation across many FANH disciplines, particularly for racially and ethnically minoritized individuals (NCSES, 2021). Thus, there is a pressing need to educate college students to support beekeeping in urban communities, to help maintain a healthy beekeeping industry and to provide students with robust careers pathways.

Materials and Methods

HONEY Pathway includes 7 distinct programs to support undergraduate and graduate students, as well as K-12 STEM faculty. During the first year, 20 undergraduate students participated in the CURE lab courses; approximately 200 students attended Seminar Series lectures, 2 participated in paid internships, 12 participated in faculty-mentored summer research development, 11 participated in beekeeping training and certification, and 2 K-12 STEM faculty participated in funded summer training in beekeeping and bee/pollinator curriculum development.

Analysis of year one data was approached as a qualitative case study (Saldaña & Omasta, 2017), supported with a nested component of descriptive statistical analysis of survey data (Leavy, 2022). Data collected includes pre- and post-participation surveys for all CURE lab students (n=20), drafts and final versions of written assignments (lab notes, research reports and research posters) for CURE lab students, pre-participation and exit interviews for faculty participants (n=2), surveys of all seminar lecture attendees (n=177), as well as exit interviews with interns and faculty-mentored summer research participants (n=27).

All surveys were administered via Qualtrics. Exit interviews (approx. 30 min.) were conducted either in person and via video conferencing, according to participant's preference.

Participation in multiple program activities is actively encouraged, which means there are students who (e.g.) have participated in both the CURE lab and in an internship.

In these cases, the post participation survey was administered to students when they completed their final activity within the program. All data has been de-identified prior to analysis.

Honey Pathway Programs



Program Engagement



Results

The HONEY Pathway program supports 6 activities each academic year: a Course-Based Undergraduate Research Experience (CURE) course (n=20), faculty-guided Summer Research Experiences (SUREs; n=10), beekeeping apprenticeships (n=11), student internships (n=2), K-12 teacher training (n=2), and a Seminar series (n>300).

Key highlights from first year survey data indicate:

- Positive shifts in all measures of academic belonging and science identity for students who participated in the CURE lab course. In all cases, post-participation survey responses indicate more positive perceptions of academic and professional skills, degree of professional preparation, and access to/experience with mentoring and support within the program.
- Positive shifts in perception of mentoring and academic sense of belonging, from majority somewhat/strongly disagree responses (65-75%) on the pre-participation survey to majority somewhat/strongly agree (73-88%) on post-participation.
- Positive shift in measures related to academic preparation and disciplinary identification, from majority somewhat/strongly disagree responses (55-100%) on the pre-participation survey to majority somewhat/strongly agree (73-88%) on post-participation.

Conclusions

As the HONEY Pathway continues to grow the team will continue to collect data and adjust programming to best serve our students. As we conclude year two, we will begin deeper analysis of statistical significance within our data. In addition, we will be conducting more in-depth content analysis of posters and course work to assess development of key competencies and communication skills.

The HONEY Pathway continues to build new partnerships and collaborations that we are hopeful will continue to make our programs a vital step in our students' educational and professional paths.

Acknowledgements

