EE-STEM Academy

Educators' Equity STEM Academy

Overview and Outcomes

Overview

The Educators' Equity (EE) STEM Academy is now in its fourth year supplemented with support by NSF to conduct research and publish its findings. The original grant expanded a highly successful professional development program in secondary education to STEM community college faculty and high school teachers in Maryland. The goal of the grant was to enhance the recruitment and academic success of underrepresented students in technician education STEM courses and programs.

NAPE, together with the Community College of Baltimore County (CCBC) and Baltimore County Public Schools, created the yearlong EE-STEM Academy, which delivered 5 days of rigorous instruction in creating equitable classrooms, eight monthly facilitated professional learning communities, and resources and tools to increase and implement strategies. At the end of the Academy, each participant presented the outcomes of his or her classroom implementations.

As part of the grant, NAPE partnered with Johns Hopkins University School of Education to test a new model that served as the foundation for understanding the impact of culture in STEM classrooms and its impact on underrepresented groups, particularly females. The data from its work in secondary schools and community colleges strongly suggest that NAPE's new model for explaining and addressing educator's implicit biases to improve student performance and persistence has real potential for increasing student engagement and performance in STEM.

Methods and Measures

The following tools were developed for program and outcome assessment:

1. The NAPE Educational Knowledge, Perception, and Self-Efficacy Survey was used with participant educators. A combined analyses comparing Pre-Academy, Post-Academy, and Post-Capstone knowledge, attitudes, intentions, and self-efficacy was done using a repeated measures mixed-effects model with Bonferroni post hoc comparisons.
2. NAPE's seven curricular units were each evaluated on a Likert scale using an assessment of impact.
3. A PLC Satisfaction Survey provided percentages for impact at the end of the PLC experience.
4. Capstone Project Outcomes Coding for student grades, retention, and STEM interest/attitudes (faculty pre- and post-course assessment) was developed and allowed for more global comparison of outcomes.
5. Case studies were collected for illustration of impact and publication.
6. PLC Facilitators Focus Group interviews were conducted for additional input.

Initial results at the conclusion of Year 3 suggest that the work has met its goal. Nine questions on a pre/post survey regarding perceptions of micromessaging and equity concepts were statistically significant (at 5%), indicating that participants' attitudes toward their students' STEM capacity and their own ability to create equity in their classrooms strengthened over the course of the program.

Additionally, careful coding and analysis of 71 participant capstone presentations from Maryland indicated that 79% of participants demonstrated a measurable improvement either in grades, participation/attendance, and/or attitudes toward STEM or STEM interest. Ten percent provided anecdotal information, and 11% reported no impact. Applying micro-affirmations resulted in the majority of measurable impacts (29%) followed by principles of equitable learning (27%) and infusing information about STEM careers (21%).

Students

Quantitative data has been requested from the Research Offices for CCBC and Baltimore County Public Schools disaggregated by gender, race, and ethnicity. The analysis is in progress thanks to the 4th year supplement. The areas of interest allow for control and treatment groups, end of semester grades in the same semester (comparing spring to spring), and overall student retention.

Conclusions

This work supports NAPE's hypothesis that beliefs about an individual's academic ability in STEM is often based on cultural biases connected to gender, race, language, income level, class, or (dis)ability. We are often unaware of our biases that shape our communication in intentional and unintentional ways in classrooms and throughout our communities. This is true in all educational courses and programs, but is most often observed in the disparity of gender and racial enrollments in college technician education programs and rigorous STEM courses, such as Honors and Advanced Placement courses. By changing their communication from micro-inequities to micro-affirmations, faculty can transform their practice and better encourage a STEM career choice.

References

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