

3.4.2 Research outside of the classroom– the K-CORE Bootcamp

Engaging in research that can motivate students to learn about the nature and process of science plays a crucial part in their decision to major in or pursue graduate degrees in STEM fields [Clewell 2006, Krehbiel & Piper 2017, Russell 2008, Russell et al. 2007]. College students who receive mentoring have improved success in terms of their grades, retention, satisfaction with college and social integration into academic settings [Crisp & Cruz 2009, Gershenfeld 2014, Jacobi 1991]. Furthermore, students develop more sophisticated critical thinking skills when they are actively engaged in the learning process, particularly in the process of “discovery guided by mentoring” [Boyer Commission]. The URE for this project, K-CORE, will provide mentorship and specialized training to KCC students.

Since its inception in 2019, K-CORE has followed a reciprocal empowerment model [Chun & Evans 2009, McCombs 1991], building a sense of ownership and professional confidence from the onset of college life. All of the PCAST recommendations to address the STEM educational crisis have been actively included in this program’s development, and will be continuously emphasized. Thus, we will provide students access to highly trained mentors/educators that have taken part in our faculty development experience so that they can engage their students in hands-on educational content that personalizes and anchors research topics into current affairs, and create pathways to STEM-related professional trajectories by emphasizing the interconnectedness of methods from different disciplines, and training students to participate in professional conferences. For example, while KCC students in the Speech program are typically only aware of speech-language pathology as a tangible career path, participating in the meetings of the Acoustical Society of America (which is a recurring activity during the K-CORE cycle), helps them gain exposure to 14 different specializations, including biomedical acoustics, engineering acoustics, architectural acoustics, signal processing, and psychological and physiological acoustics.

To establish continuity with local CUREs, in the future a Research Experience Level 2 badge will be earned after completion of K-CORE with the following competencies: (1) critical thinking, (2) data analysis (selecting the appropriate data analysis technique), (3) understanding of ethical principles governing human subject research, (4) information literacy, (5) technological literacy, (6) public presentation of research at a conference.

To date, 24 students completed K-CORE, having delivered 39 presentations at professional conferences in the US and abroad. Participation in the first cycles resulted in a significant perceived increase in research and collaborative skills ($F(1,64) = 92.3, p < .001$). Furthermore, despite substantial overlap with the COVID-19 lockdown, K-CORE students initiated regular Zoom meetings, joined a LinkedIn and a What’s App closed group where they often socialized, and later pursued in-person social activities together. These unplanned activities initiated by participating students are relevant for student outcomes, as developing a sense of community and belonging is an important factor predicting student persistence in STEM, especially among underrepresented minority students [Hurtado & Carter 1997, Locks et al. 2008]. With the addition of new faculty mentors, the number of mentees will increase to 60 in the final year of the project. During our project duration, we will further improve K-CORE by using the lessons learned from other successful programs [Abler et al. 2011]. We will also integrate materials relevant to K-CORE such as instructional resources and student research outcomes to our central support website and include a dedicated URE component to the INTREPID toolkit, enabling additional faculty from a range of non-traditional STEM disciplines to become mentors in the program. Other benefits include the fact that the mentoring experience is likely to inform and impact faculty practices in the CURE classroom, leading to enhanced psychosocial support for students through faculty encouragement, empathizing, and serving as a role model [Kram 1988, Dolan 2016].