PRECS: A collaborative model for undergraduate research with community college students

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Abstract
PRECS, Phenotypic Plasticity Research Experience for Community College Students, is a NSF BIO REU Site that provides authentic research experiences for community college (CC) transfer-track science majors. PRECS is a collaboration between the University of Illinois at Urbana-Champaign (UIUC) and Parkland College, a nearby CC. During the summers of 2017-2019, PRECS supported 32 CC participants, including 10 under-represented minorities and 15 first generation students. These are transfer-track students who plan on completing a BS and may have plans to pursue graduate degrees in the sciences. Many STEM students (almost half) take STEM courses at community colleges, but one study has shown only 14% persistence in STEM majors for students in two-year colleges (Olsön 2012). One of the most effective ways to attract and retain students in STEM majors is providing undergraduate research experiences, and these programs are now considered a fundamental part of undergraduate STEM education (Olsön 2012, American Chemical Society 2009).

Intellectual Focus
The theme of PRECS is phenotypic plasticity, the phenomenon of a single genotype producing multiple phenotypes depending on environment. Students conduct research in diverse areas, including the interaction between genotype and ozone pollution on maize growth, the effect of environmental stress on neuroanatomy, and the interactions of genes and environment on fish behavior.

Program Design
Pre-program activities
March: applications due
April: acceptance and lab match
May: registration & housing, virtual safety and record-keeping modules

Boot-camp at Parkland
Orientation, lab- and lecture-based activities, meetings with mentors
Assessment: pre-post quiz, attitude survey

Research immersion
Full-time lab research at UIUC
Lunches: transfer talks, technique presentations, professional development seminars
Community outreach and connecting with high school scholars
Meeting with other UIUC summer undergrad researchers & visiting with other IL BIO REUs
Poster presentation at campus-wide research symposium
Exit research videos
Assessment: Final attitude surveys

Post-program activities
Oral presentation at home or nearby community college
Ongoing communication with program and alumni

Student Population
PRECS targets CC students who are interested in pursuing careers in science. These are transfer-track students who plan on completing a BS and may have plans to pursue graduate degrees in the sciences. Many STEM students (almost half) take STEM courses at community colleges, but one study has shown only 14% persistence in STEM majors for students in two-year colleges (Olsön 2012). One of the most effective ways to attract and retain students in STEM majors is providing undergraduate research experiences, and these programs are now considered a fundamental part of undergraduate STEM education (Olsön 2012, American Chemical Society 2009).

Results: Student Demographics

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Students showed significant (p<0.001) improvement on a post-boot camp content quiz (shown above) and stated that that boot-camp was effective at promoting confidence and community.

Student comment: “Socialization during boot camp with fellow PRECS students, leaders, and mentors was my favorite part of the boot-camp. It helped me feel more like the challenge was more obtainable and I was not going to be alone in struggling to succeed in my research. It put me at ease to know I had several people I could talk to. Also learning new things was exciting for me.”

Post-program Results:
Post-program assessments showed student gains in all areas, including personal gains, thinking like a scientist, and skills. They also showed gains in interest to pursue research in a future career. The open answer responses were also insightful and affirming, with many students stating that participation in PRECS was transformative.

Student Experiences
“This was so helpful to me. It reaffirmed my desire to be in a science career, something which I had been questioning, and I’ve regained my excitement for my education and eventual career. Thank you for the opportunity!”

References

Acknowledgments
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http://precs.cc.illinois.edu/