Fostering Supportive Learning Environments for Diverse Students in STEM Through Cooperative Research Teams

Project Personnel **Total Award Amount** **$** 100,000

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Project Description

There are fewer skilled professionals in the sciences, which negatively affects US global competitiveness (Augustine 2005). One contributor to this shrinking pipeline of science professionals is the lower science degree attainment among underrepresented students. Only 24% of racial minority students complete a science BA degree within six years compared to 40% of White students (Institutional Data Exchange 2000). This project proposes a major reason more women and underrepresented minorities do not pursue or complete education and careers in science fields is due to a hostile climate in the sciences that promotes prejudice and discrimination (Eccles 1987; Johnson 2007).

The objective of this grant is to improve the scientific climate of the Colleges of Engineering (CoE) and Science (CoS) to be supportive of all students regardless of gender, race, and SES and to improve the science degree attainment of underrepresented groups. This will be achieved by changing the learning environments of engineering and biology students to emphasize cooperative learning and promote a diverse community. This study will test for the existence of threatening learning environments in the CoE Engineering Design Projects (EDP) and the CoS Collaborative Research Labs (CRL). With the aim of improving learning environments for all students regardless of their gender, race, and SES, we propose an experimental test of implementing cooperative learning into the research teams. This will be achieved by training engineering and biology faculty to effectively foster and supervise cooperative student research teams and incorporate cooperative learning into the curriculum,

thereby decreasing the competitive climates in engineering and biology. The first research question is whether instituting formal, cooperative jigsaw research teams (Aronson 1978) is effective in improving college climate, increasing identification, commitment, and sense of belonging to engineering and biology, and improving academic performance among underrepresented students in engineering and biology. The second research question is whether using a structured, train-the-trainer model focused on cooperative learning strategies among faculty is effective in improving attitudes toward cooperative learning strategies, increasing intentions and actual use of cooperative learning strategies in the curricula, and improving college climate. By embedding professional development in the curriculum, positive climate change will be institutionalized and sustainable.

The over-arching goal of this project is to use the evaluation of the undergraduate research experience through EDPs and CRLs to inform and implement faculty professional development aimed at improving teaching methods, research mentoring and supervision, and student outcomes. By using the jigsaw classroom model, faculty members will become advocates in improving climate, equally in the classroom, research labs, and operations of the CoE and CoS.