Abstract

The overarching goal of the CSUF-HHMI Research Scholars Program is to promote and encourage the flow of individuals—from our diverse and disadvantaged student populations—into science careers as leading researchers and teachers. By identifying, developing, and preparing those with potential.

Weekend Research Experience (WRE)

Organization and Goals

A major objective is to expose both high school students and high school science teachers to what it is like to perform actual research. Another is to include HS science/math teachers, to remind them of the importance and excitement of doing research, which might infect and influence their ways of teaching science and highlight this career option for their students. Students and teachers from local high schools applied and were selected for Weekend and Summer Research Experiences (WRE and SRE). Survey and assessment data indicated a significant increase in the interest level in research as a career, statistically significant changes in perception of scientific knowledge as subject to change, that intellectual honesty and decisions based upon sufficient evidence are traits of scientists, and that science as an idea generating activity. All students contacted after year three indicated they were/were to become college science majors. Teacher responses were very positive; their presence in faculty laboratories directly exposed undergraduates to this career option and led to a new program emphasis on careers in science teaching. The results indicate that this program is likely to yield the desired outcomes.

Some Results of Assessing these Programs

Organization and Support

These high school cohorts spend most of their time working together in a given faculty laboratory on a supervised research project. In addition, they participate in a weekly seminar, taught by Drs. Barbara Gonzalez and Monica Azimioara. The purpose of the weekly seminars is to engage in discussions on the nature of science, read primary literature on the role of lab work and research in science education, provide support for the four cohorts as they transition into their research labs, offer support for preparing a formal report and oral presentation for the last day of the program, help the HS teachers and students generate ideas about how they can share the 5-week summer research experience with their schools. We also encourage those HS participants who enter college at the end of the summer to look for opportunities to engage in scientific research at their new campus. The teachers receive a significant stipend, and the students an honorarium. They also all obtain college credit for participating in a research course at CSUF.

We have found that not just the undergraduates, but the HS cohorts (including the HS students) are capable of understanding the objectives of their projects, and the significance of the outcomes of their work. They learn basic and advanced techniques and achieve the technical capabilities to obtain significant publishable data that contribute to the scholarship of mentor faculty. Those who have witnessed the presentations at the end of the 5 weeks have been amazed at what the participants have learned and are able to express and debate.

Science Attitude Inventory Results HS SRE

Aggregated Subjects 2009 and 2011 HHMI HS SRE

Factor Category

Mean (SD) t df p

1-AB SRE Scientific knowledge is subject to change 23.81±1.15 0.70 25 p>0.05

1-AB Pre 25.21±3.36

3-AB Pre Scientific knowledge is based on sufficient evidence 28.04±2.89 4.52 25 p>0.05

3-AB SRE 25.54±2.24

4-AB Pre Science is valuable for its theoretical, explanatory aspects 19.21±2.48 1.76 25 p>0.05

4-AB SRE 18.12±1.78

Total Pre 162.96±7.58 1.71 25 p>0.05

Total Post 164.81±5.52