Intercultural assessment of an undergraduate overseas STEM research experience for U.S. students

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ABSTRACT

The Plant Science for Global Food Security (PSGFS) program is a National Science Foundation (NSF)-funded international summer research experience for undergraduate students led by Purdue University. U.S. students travel to the International Rice Research Institute in the Philippines for a 6-week summer program that includes a 3-week research experience in rice science with individual scientific laboratories coupled with a 3-week course in international rice research. Prior to implementation of Year 1 on the project, the principal investigators of PSGFS partnered with Purdue Evaluation and Learning Center (ELRC) to gauge the impact of this international research experience on intercultural awareness and career objectives of the participants. Results of that short study are presented in this white paper. The study was designed to capture how participants made sense of their international experience at different stages in the program and provide a snapshot of knowledge, skills, and attitudes pertaining to different cultures. ELRC gathered data from program participants before, during, and after completing the six-week program in the Philippines in the summer 2022 using a self-assessment tool to explore individual cultural competence. Pre-program results indicated a high degree of confidence among participating students while post-program confirmed students' self- perceptions of high scores while simultaneously indicating growth in each of the three areas of interest (cultural awareness, skills, and attitude).

INTRODUCTION

The Plant Science for Global Food Security (PSGFS) program is a National Science Foundation (NSF)-funded international summer research experience for undergraduate students led by Purdue University. U.S. students travel to the International Rice Research Institute in the Philippines for a 6-week summer program that includes a 3-week research experience in rice science with individual scientific laboratories coupled with a 3-week course in international rice research. Purdue has five collaborating universities for student recruitment on the program, four of which are minority-serving institutions. These include three HBCUs (Historically Black Colleges and Universities) and one AANAPISI (Asian American and Native American Pacific Islander-Serving Institution) to enhance participation of underrepresented minorities. While more research on examining the direct impacts of study abroad experiences on minority students is needed, there is growing evidence that these experiences can have benefits on graduation rate and general learning outcomes (Sutton and Rubin, 2007; Raby, Rhodes and Biscarra, 2014; Fredricks, Blumenfeld and Paris, 2004). Of note, two of our partners, North Carolina A&T and Florida A&M, were called out as two of the few U.S. institutions to have designed targeted approaches for recruiting minorities for study abroad in a recent report on the impacts of study abroad programs on underrepresented students (Engel 2017).

As part of program preparation for the selected undergraduate participants, PSGFS holds a series of virtual pre-departure orientation sessions from April until summer departure. In addition to general networking and Q&A sessions about logistics, three of the virtual meetings are dedicated to cultural awareness and understanding, and students are required to complete a series of learning modules developed by Purdue University's Center for Intercultural Learning,

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Mentorship, Assessment and Research (CILMAR) via the Learning Management System, Brightspace. These modules include: Understanding Accents Different from Your Own; Learning about Your Own Cultural Self; Talking with People across Cultural Difference; Intercultural Collaboration; Digging Deeper with Critical Reflection.

Due to its international context, the PSGFS program represented a prime opportunity to assess intercultural learning interventions in scientific research programs. To take advantage of this opportunity, a short study was funded by Purdue University's Center for Intercultural Learning, Mentorship, Assessment and Research (CILMAR) to design and apply appropriate survey instruments to assess intercultural awareness of student participants before and after participation in the overseas research experience. Results may inform changes to pre-departure training in Year 2's program to enhance impact on intercultural learning.

PARTICIPANTS

The first cohort in the PSGFS program was selected during Spring of 2022. Each application was reviewed by 3 reviewers in addition to the PI and co-PI using a standard rubric circulated to each reviewer in January 2022. Reviewers were selected from a group of faculty and staff originating from each of the six participating institutions on the program. The final student participant group consisted of 8 undergraduate students, aged 20 to 28, from five of the six U.S. institutions (Purdue University, University of Illinois, University of Hawaii at Manoa, Florida A&M University, and North Carolina A & T University). 75% self-identified as women, 25% as men, and students had a variety of academic backgrounds (**Figure A1**).

SURVEY INSTRUMENT

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Purdue Evaluation and Learning Center (ELRC) developed a survey instrument inspired by the Association of American Colleges and Universities (AACU) Intercultural Knowledge and Competence Value Rubric. The survey was implemented via Qualtrics on the first day of the program and after students returned to the States. Halfway through the program, students additionally reflected on the first three weeks with the help of one key encounter. Students responded to survey questions in the areas of "Cultural awareness," "Cultural skills," and "Cultural attitude." A Likert scale was used to gauge participants' level of agreement to the frequency to which each survey item applied to their lives, before and after the experience, with possible responses including "never," "sometimes/occasionally," "fairly often/pretty well" and "always/very well." Open-ended questions sought methodological and topical input. Methodological questions sought input to improve the survey tool. Topical pre-departure questions engaged participants' background, hopes and expectations for the program. Postprogram questions inquired about the extent to which the international experience shaped participants' thought about their own cultures, global dynamics, and future aspirations.

RESULTS

Results include ten key findings categorized as follows: 1) three findings related to student feelings and expectations; 2) six effects of the program on students' cultural competencies; and 3) suggestions for program improvement (**Appendix B**). Overall, the survey tool effectively helped participants reflect more deeply on their cultural awareness, skills, and attitudes. Though students rated themselves highly across the scales, shifts across all three sub-areas (awareness, skills, and attitudes) indicate participant recognition of both their strengths and areas needing further development to become fully culturally competent. The written responses indicated room

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for participants to grow their cultural competence. Students framed their responses using familiar vocabulary that reflected their relative ignorance, inexperience, and narrow worldview.

Pre-departure results indicated a high degree of confidence among participating students for the anticipated international experience, as demonstrated by very high scores in knowledge, skills, and attitudes on the cultural competence scales. Post-program results confirmed students' self- perceptions of high scores while simultaneously indicating growth in each of the three areas. Participants' strong sense of their communication and empathy skills may be an immediate result of the cultural competence training they underwent prior to and in preparation for the international experience. For example, the overwhelming awareness of cultural influences on work habits and values indicates that the pre-departure cultural awareness training may have emphasized these important components of international research experiences. Participants confirmed this interpretation in their open-ended responses, noting their desires to gain a better understanding while expecting bumps in the road, e.g., in the work protocols and procedures.

Cultural self-awareness constitutes the only category in which the survey mean dropped. This shift in self-description is a strong indication of growth in cultural self-awareness as students may not only recognize the complexity about own cultural perspectives and biases but also respond to it. Though students scored themselves highly on the awareness of their own assumptions about cultures and the extent to which it is influenced by their own cultural perspectives, the open-ended responses still indicate room for growth and need for further reflection (e.g., the misconception to have "been exposed to filipino (sic) culture in varying degrees just by living in the US").

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APPENDIX A

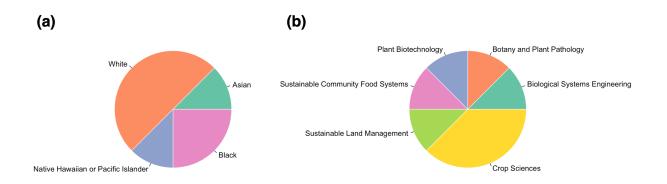


Figure A1. Demographics of the first cohort of PSGFS. (a) Racial and ethnic background of participants and (b) academic major.

APPENDIX B

Finding #1: Students felt prepared.

Finding #2: Students hoped to grow professionally and personally.

Finding #3: Students anticipated challenges during their time abroad.

Finding #4: The international experience helped students grow in cultural awareness, skills, and attitudes.

Finding #5: The international experience changed how students see themselves and others.

Finding #6: The international experience improved students' confidence in communicating across cultures.

Finding #7: The international experience increased student curiosity about and openness towards other cultures.

Finding #8: The international experience exposed participants to differences at the workplace and beyond.

Finding #9: The international experience confirmed participants' international career desires.

Finding #10: Survey suggestions hint at ways to improve program preparation.