

In the past, faculty at NCC offered a limited number of undergraduate research experiences (UREs) to students, mostly as sporadic independent research courses in STEM fields (biology and microbiology); capstone projects in various disciplines; and some experiential, course-embedded projects (chemistry, biology, ecology, psychology, and research methods in the social sciences).

Faculty in STEM and administrators at the NCC-Monroe Campus recognized the importance of UREs as high-impact teaching practices but were realistic about the limitations of a two-year institution. As community and institutional partnerships are important in the creation of long-standing programs, faculty sought a community grant from a local pharmaceutical company, which provided the first NCC Stem Pipeline Project for 2016–2018. The project was designed to benefit students from high school through postsecondary education, with dual-enrollment scholarships, STEM scholarships for NCC students, equipment purchases, and co-disciplinary UREs. The primary goal of adopting the co-disciplinary model was to improve overall scientific literacy amongst all students from multiple viewpoints, using science and non-science faculty partnerships. Examples of these projects involved biology-speech communication (oral presentations) in academic year 2016–2017 and chemistry-English (written presentations) in 2017–2018.

This initial grant supported the purchase of additional new technology for the labs; tuition funding for additional STEM students in need; and, most important, retention of STEM students.

These outcomes were recognized by both the institution and stakeholders, resulting in an award of an additional two years of support to expand the regional STEM education pipeline. Consequently, the 2018–2020 project was designed with three goals: (1) to maintain student support through dual-enrollment and STEM scholarships, (2) to increase faculty and institutional support for UREs, and (3) to establish permanent research sites. A faculty survey sent in 2019 revealed that students' lack of time and preparation as well as faculty teaching load, remuneration, and lack of research space were some of the main challenges at the institution. To address these issues, selected faculty developed a strategic plan to expand offerings of UREs, researching the best models and continuing conversations with administrators and staff to develop internal support and enable wide-scale adoption. The funding provided by this project allowed for the establishment of two permanent research sites on campus: an avian research center that has been active since fall 2018 and a greenhouse, currently under construction.

Based on these experiences, the following recommendations are offered to those initiating UREs at a community college:

- Identification of the challenges for the development of UREs at the specific institution is essential. Teaching loads, remuneration, and lack of space are important limitations that need to be addressed by the institution to increase faculty participation.
- Local support through community grants can help provide the funds needed for UREs. A multipurpose project that provides scholarships to students as well as infrastructure can be recognized as a successful long-term investment.
- Creation of UREs that best fit an institution's unique characteristics is paramount, but starting simple is important: embedded course experiences seem to be the best fit for those new to UREs (such as collaboration with local organizations and citizen science projects).
- For first- and second-year undergraduate students, learning about the research process is more valuable than finishing a successful project. They should be encouraged to learn from even disappointing results.

Acknowledgment

The authors thank Sanofi Pasteur U.S. for the funding of these grants to support the two NCC STEM Pipeline Projects.

Full-Spectrum Undergraduate Field Research at a Community College

Scott L. Walker

Northwest Vista College, swalker6@alamo.edu

doi: 10.18833/spur/4/3/8

Conceptualizing and designing undergraduate research programs for general studies community college students can be challenging. However, there are frameworks available through which a cogent design can be developed. Two broad categories of thinking guided the development of an undergraduate research agenda in the Geography and Environmental Sustainability (GES) Program at Northwest Vista College (NVC) in San Antonio.

The first category was a paradigm shift in categorizing need. Employers assert that new college graduates need both field-specific and broad-ranging knowledge and skills—the latter, which are more highly valued, are often referred to as *marketable skills*. These interdisciplinary skills typically include communication, teamwork, decision-making, critical thinking, and knowledge application. A study of 400 employers indicated that organizations are more likely to hire recent graduates who have completed projects that required research, problem solving, and communication. Moreover, employers are more likely to hire graduates with collaborative research experience and those with study abroad experience (Hart 2015).

Marketable skills are often bifurcated into cognitive/non-cognitive or soft/hard skills. Decontextualized, noncognitive, “soft” skills such as communication and teamwork—as opposed to discipline-based concepts and hard facts—are often viewed as mushy and valueless (Hora, Benbow, and Smolarek 2018). However, to be considered a capital asset (i.e., having value), communication, teamwork, decision-making, critical thinking, and knowledge application must be addressed in the cultural context of a *specific* workplace or industry sector. That is, they must be viewed in the context of professional communities and organizations, not in an unnuanced, illusionary, generic vacuum of workplace skills, so that they are truly applicable and free of soft and mushy associations.

The second category consisted of measuring research levels in the GES program. With the cultural capital context paradigm in mind—in this case, that of the environmental sector workplace where investigation and problem-solving are key—an undergraduate research program was developed with four levels: (1) course-based activities, (2) course-based projects, (3) student-faculty collaboratives, and (4) external research. From there, a 31-item inventory of cultural capital-informed marketable skills—the Marketable Skills Inventory for Geography and Environmental Sustainability Fieldwork (MSIGES)—was developed. This inventory was used to measure the extent to which students were offered skill building opportunities, and their perceptions of gaining these skills, in NVC’s Adventure Science field studies program in Morocco. Sample skills in the context of environmental sustainability that are culturally determined and dependent on context include the following: analysis, synthesis, application of knowledge, research skills, adaptation to new situations, and ability to work in international contexts.

In the Adventure Science program, undergraduate field research was connected to marketable skills. The program partnered with the nongovernmental Atlas Cultural Foundation (ACF) in Morocco to conduct research that superseded typical study abroad goals and included levels 1–3 research. Some of the participating students ($n = 6$) opted only for in-class research as a part of their for-credit study abroad course, whereas others opted to use the class-collected data and write a technical report modeled on that of a private environmental engineering consulting firm that had conducted the same research two years prior. These community college students wrote a professional, 24-page technical report they submitted to ACF, as well as used it as the basis for an academic conference presentation and a peer-reviewed journal article.

At the end of the Moroccan hydrology field study, students’ perceptions were measured in terms of marketable skills specific to geography and environmental science with the MSIGES. On a 1 = never occurring to 5 = often

occurring scale, items related to diversity, teamwork, interpersonal skills, and application of knowledge had the strongest results ($\bar{X} = 4.7$ to 5.0). Items related to leadership, which are perceived as important to employers, were not perceived as strong by the students themselves ($\bar{X} = 4.3$), despite their work in teams and as leaders. Further, “capacity to apply knowledge” and “teamwork” were perfectly correlated ($r = 1.00, p = 0.01$), as was “working in interdisciplinary teams,” “appreciation of diversity,” and “working in an international context” ($r = 1.00, p = 0.01$).

Two themes emerged from the open-ended items:

1. Students perceived “teamwork” as a skill that employers would find important and were able to give concrete examples of their collaborations in teams, and
2. Students equally believed employers would find “leadership” as important; however, none offered any concrete examples of leadership from their fieldwork, despite the observation of this quality by the leading faculty, demonstrating that marketable skills sometimes need to be highlighted for students who are experiencing them.

References

Hart Research Associates. 2015. *Falling Short? College Learning and Career Success*. Washington, DC: Hart Research Associates.

Hora, Matthew T., Ross J. Benbow, and Bailey B. Smolarek. 2018. “Re-Thinking Soft Skills and Student Employability: A New Paradigm for Undergraduate Education.” *Change: The Magazine of Higher Learning* 50(6): 30–37. doi: 10.1080/00091383.2018.1540819

Summit Recommendations Provide Guidance to Expand Undergraduate Research Experiences at Community Colleges

Madeline Patton and Ellen Hause

Madeline Patton Writing & Editing Services/American Association of Community Colleges, mpattonwriting@gmail.com

doi: 10.18833/spur/4/3/9

The Community College Undergraduate Research Experience Summit was a rare opportunity for educators from various STEM disciplines and a cross section of institutions to share their perspectives on efforts by two-year colleges to build, implement, and sustain undergraduate research experiences (UREs).

The enthusiasm of the 120 thought leaders for UREs was evident in the lively poster showcase, plenary sessions, and small-group discussions where participants were mixed intentionally to seed candid dialogue about scaling and sustaining UREs at two-year colleges and related topics. The top recommendations from each small group were reviewed by all participants.