

Developing an HAB Undergraduate Research Program at the City Colleges of Chicago

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Engaging community college students in research experiences can increase their interest in science, facilitate their transition to four-year colleges, and motivate them to pursue STEM careers. Because of these benefits, many community colleges increasingly emphasize student research beyond “cookbook and taxform” laboratory experiments. The City Colleges of Chicago are a network of seven community colleges serving approximately 120,000 students. In summer 2013 the City Colleges teamed up with DePaul University to train faculty in HAB and conduct a six-week undergraduate research program. City Colleges faculty members subsequently formed a leadership team consisting of science, math, and communication faculty members to investigate how to integrate HAB into science courses, summer research and K-12 outreach. We will discuss some of the unique challenges of conducting undergraduate research at community colleges, as well as future plans and opportunities for collaborative HAB projects.

I. Introduction

Community colleges play an increasingly important role in the education of the STEM workforce of this country. According to an InfoBrief of the National Center for Science and Engineering Statistics¹, the percentage of science, engineering, and health graduates who have ever attended a community college is approximately 50%. Community colleges also educate a substantial number of K-12 STEM teachers². Community colleges play an especially important role in educating students from diverse racial and economic backgrounds³. The City Colleges of Chicago are one of the largest community college systems in the US, with 5,700 faculty and staff serving more than 115,000 students at seven colleges and six satellite sites. Approximately three quarters of its students self-identify as coming from ethnic groups underrepresented in STEM and over half receive federal or state financial aid.

It has been well documented that providing community college students with research experiences, coupled with faculty mentoring and networking, is an effective way to recruit and retain students in STEM disciplines and help them transfer into four-year institutions^{4,5,6}. In spite of these benefits, few community college students are currently engaged in STEM research. In this article we describe a partnership between the City Colleges of Chicago and DePaul University designed to generate research opportunities in HAB for City College students.

II. Unique Challenges

Traditionally, community college students and faculty have not been widely involved in undergraduate research. These coveted positions have been reserved for upper-level juniors and seniors rather than the freshman and sophomores who attend community college. And community college faculty members have been urged to focus on teaching without the distraction of research. We now know that undergraduate research has positive impacts on all students and faculty. It helps with student recruitment and retention, and it positively impacts student development. For faculty, it informs and invigorates their teaching, benefiting all students. As the need to grow and diversify the STEM workforce has grown, the large and diverse student body beginning their academic careers at community colleges must be afforded the opportunity to do undergraduate research, along with the faculty members that teach them⁷.

III. Previous Activities

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The HAB partnership between the City Colleges and DePaul University began in summer of 2009 as part of the Chicago Initiative for Research and Recruitment in Undergraduate Science (CIRRUS). During a six week summer research program a team of seven students from the City Colleges and DePaul University designed and built a cosmic ray scintillation detector and completed three balloon flights. A second CIRRUS student team investigated sources and sinks of carbon dioxide by measuring variations of CO₂ concentrations at different altitudes in Earth's atmosphere over time and at different locations and completed six balloon flights in summer 2013⁸. Also in 2013, Taylor University funded a City College faculty training workshop at DePaul University on July 12 as part of a National Science Foundation CCLI grant⁹ (Award #1047557). This workshop was followed by two training flights on August 16 for faculty and on September 13 for both faculty and students. A total of 10 City College faculty members and 14 of their students participated in these events.

IV. Future plans

Building on our experience with the 2013 summer faculty workshop, CIRRUS and other undergraduate research programs involving community colleges such as STEM-ENGINES⁷, a group of science, math and communication faculty from the City Colleges and DePaul University continued to meet regularly after the summer to design a plan for developing a HAB program at the City Colleges. This plan includes four major components:

1. A set of 3-4 week classroom HAB research modules for non-majors STEM courses that can be integrated in existing physical and life science courses. Students would use data from prior launches and apply the scientific method to construct questions that can be answered by experimental design of an HAB payload and data analysis.
2. An HAB summer research program for science majors led by City College faculty mentors and modeled after CIRRUS.
3. A student-led HAB outreach program to Chicago Public School students in grades 6-12 through the existing *Saturday Academy* at Malcom X College.
4. A series of HAB faculty development workshops similar to the one we held in 2013.

The plan also has a strong faculty mentoring component as well as networking opportunities with peers and faculty members. Currently the group is working on identifying internal and external funding sources.



Figure 1: Thomas Higgins (Harold Washington College), Catherine Han (Daley College), Daniel Karcz (Malcolm X College) and Vinay Duggal (Wright College) during the faculty training launch on August 16, 2013.

