

Panel - The Computing Alliance of Hispanic-Serving Institutions: Interventions to Increase Hispanic Participation in Computing

Malek Adjouadi¹, Richard Alo², Mohsen Beheshti³, John Fernandez⁴, David Novick⁵, and Nayda Santiago⁶

Abstract – This panel presents the Computing Alliance of Hispanic-Serving Institutions. The Alliance, developed by eight HSIs with funding from the NSF’s Broadening Participation Program, seeks to increase the numbers of Hispanics in all areas of computing, including increasing the number of Hispanic students who enter the professoriate, retaining and advancing Hispanic faculty, and developing and sustaining competitive research and education programs at HSIs. The Alliance addresses issues of educational diversity by recruiting students into computer science, preparing students to succeed as computing majors, supporting students in their studies through peer-led team learning, helping students develop learning and career skills, and moving students from undergraduate programs into Ph.D. study. The objectives of and opportunities to work with the Alliance will be explored by five representatives of Alliance institutions.

Index Terms – Diversity, Hispanic-serving institutions, Recruiting students, Peer-led team learning.

PANEL OVERVIEW

With funding from the NSF’s Broadening Participation in Computing program, eight Hispanic-serving universities have formed an alliance to increase the numbers of Hispanics in all areas of computing, including increasing the number of Hispanic students who enter the professoriate in computing, retaining and advancing Hispanic faculty in computing, and developing and sustaining competitive research and education programs at HSIs. In terms of education, specifically, the Alliance addresses issues of diversity on several frontiers: recruiting students into CS, preparing students to succeed as CS majors, supporting students in their studies through peer-led team learning, helping students develop learning and career skills, and moving students from undergraduate programs into Ph.D. study. The Alliance will disseminate best practices in these areas.

David Novick will introduce the Alliance and moderate the panel discussion. The panelists will discuss the main issues by describing how the Alliance tackles them. The format of

the panel will encourage participation from attendees, particularly with a view to enabling faculty and students at other institutions of all types and profiles to make strides with respect to diversity. Audience members will be asked to share diversity issues they have faced.

STUDENT RECRUITING

John Fernandez will discuss student recruitment. Despite reports that demand for CS and IT professionals will increase substantially in the coming years, recent studies and surveys show a troubling decline in the number of undergraduate students who are declaring CS as a major.

The Alliance will disseminate best practices in recruiting developed over the past three years at Texas A&M University-Corpus Christi. Faculty and students worked together to design and implement a recruitment program aimed at reaching out to high school students. One important consideration in hiring college students as recruiters was to create a team that accurately reflected the diversity of the population in south Texas. The recruiting team produced a brochure describing the CS field and showing pictures of students involved in activities on campus, set up a Web site with about the CS program, created a PowerPoint presentation and display board for use in recruiting visits to high schools, and went to high schools, junior colleges, and other pre-college programs to give in-person presentations about the CS program at A&M-CC. The in-person presentations were followed up with the recruiters making phone calls to students who expressed an interest in the program.

In the fall semester of 2005, the number of incoming freshmen who declared CS as their major increased by 14%. This was the first significant increase in five years. The spring semester of 2006 showed a 22% increase in freshmen over the previous spring semester.

“CS 0” COURSE

Mohsen Beheshti will discuss the development of a “CS 0” course to prepare entering students in computing, which will be a three-unit course (not for credit toward the CS major) that

¹Malek Adjouadi, Professor of Computer Science, Florida International University, adjouadi [at] fiu.edu

²Richard Alo, Professor of Computer Science, University of Houston—Downtown, ralo [at] uh.edu

³Mohsen Beheshti, California State University—Dominguez Hills, mbeheshti [at] csudh.edu

⁴John Fernandez, Assistant Professor of Computer Science, Texas A&M University—Corpus Christi, jfernand [at] sci.tamucc.edu

⁵David Novick, Associate Vice Provost and SBC Distinguished Professor of Computer Science, The University of Texas at El Paso, novick [at] utep.edu

⁶Nayda Santiago, University of Puerto Rico—Mayagüez, Nayda.Santiago [at] ece.uprm.edu

introduces computer programming and concepts. The course addresses the lack of preparedness of students to succeed in the first computer science course for majors. "CS 0" courses are helpful when students are under-prepared or have false confidence about their abilities to succeed in CS1, as tends to be the case for Hispanics and others from underrepresented groups [3]. Students with no prior background in computing enroll in the course, and they are provided with the opportunity to learn the basics of programming concepts and develop problem solving and systemic reasoning skills while becoming familiar with a programming environment. "CS 0" courses can also serve as a recruitment tool to attract other majors who are taking it as one of their science electives.

PEER-LED TEAM LEARNING

Richard Alo will discuss peer-led team learning (PLTL), which will be disseminated as a best practice. The PLTL Workshop model engages teams of six to eight students in learning sciences, mathematics and other undergraduate disciplines guided by a peer leader. The PLTL Workshop model provides an active learning experience for students creates a leadership role for undergraduates and engages faculty in a creative new dimension of instruction.

PLTL helps students become better prepared for the modern workplace by developing communication and team problem-solving skills. PLTL originated at The City University of New York as a pilot project funded by the NSF. In a study of the effectiveness of PLTL, across a variety of institutions, disciplines, and course levels, students using peer-led workshops performed substantially better than their counterparts in non-workshop courses [2].

In CS, the first three introductory courses are typically "gatekeeper courses;" that is, courses that cause many students to fail or drop-out of the courses and possibly the major. Among the significant reasons for failure are lack of preparation and lack of support inside and outside the classroom. PLTL can address these causes of attrition by engaging the student in the university and the discipline of computer science and engineering. Peer leaders serve as role models by providing general university knowledge, discussing study skills, and providing meaningful personal assistance to students to manage their need to support themselves and their family obligations [1].

DEVELOPING SKILLS

Nayda Santiago will discuss best practices for developing educational and career skills for students. The goal is to teach undergraduate and graduate students those skills that will assist them in entering and sustaining a place in the pipeline of graduate education in computing. Experience tells us that most undergraduate students are capable of learning and applying computing skills as well as those students attending tier one universities. However, they mostly lack knowledge of available opportunities, resources, or some skills which will

allow them to succeed in graduate school. The Alliance partners will focus their attention on developing student seminars in oral communication skills, interdisciplinary teamwork, project management, applying to graduate school, technical writing in computer science and engineering, teamwork, leadership, and on being assertive – the Hispanic perspective.

PH.D. PIPELINE

Malek Adjouad will discuss strengthening the student pipeline through the Ph.D. For CS departments generally, building a quality research program is critical not only for its yield of practical implications and the societal impact it engenders, but it is also akin to survival for both academia and the industry as the frontier of science together with the many uncertainties it encloses seem to elude some of us, overwhelm others, and leaving as a consequence so many others trailing behind in this global economic divide. It is almost a natural transition, then, to harness all the requirements for attracting the best and most qualified students to enter the Ph.D. program and be a contributing force to research.

The merit of the research themes explored, availability of a modern infrastructure, faculty devotion to research and mentoring, role models already in place, accessible peer support groups, diversity in the research themes and in the human capital are all an integral part of a quality research program. This is not an easy task for any one institution to reach all these goals and at the same time envision the other half of the problem just as ominous, that of broadening the participation of minorities, women and persons with disabilities in computing. It is a strong claim of the Alliance, that by joining forces in our different areas of strength, we will create an unprecedented opportunity to bridge all of these aspects that could overwhelm any one institution attempting such a feat in isolation.

ACKNOWLEDGMENT

This work is supported by the National Science Foundation through the Broadening Participation in Computing program. The Hispanic Association of Colleges and Universities is a partner of the Alliance and contributed substantially to the ideas embodied in the project.

REFERENCES

- [1] Bonsangue, M. and D. Drew, "Five-Year Evaluation, Phase I 2000-2005 NSF Houston LS-AMP Grant," NSF 2005.
- [2] Goodlad, S. The Effectiveness of Peer Tutoring in Higher Education: A Typology and Review of the Literature, in *Mentoring and Tutoring by Students* (Sinclair Goodlad, Ed.), pp. 49 - 69. London: Kogan Page, 1998.
- [3] Seymour, E. and Hewitt, N. M., *Talking about Leaving, Why Undergraduates Leave the Sciences*, Boulder CO: Westview Press, 1997.