# Table of Contents

Participant Individuals .............................................................................................................. 3  
Detailed Description .................................................................................................................. 3  
Organizational Partners ............................................................................................................. 6  
Other Collaborators or Contacts ............................................................................................... 7  
Research and Education Activities ............................................................................................ 8  
  A. CAHSI Initiatives ................................................................................................................ 8  
  B. Resource Development ...................................................................................................... 16  
  C. Collaborations .................................................................................................................. 17  
  D. Social Science Network .................................................................................................... 18  
Findings ..................................................................................................................................... 19  
Training and Development ........................................................................................................ 19  
Outreach Activities .................................................................................................................... 20  
Publications ............................................................................................................................... 20  
Web/Internet Site ....................................................................................................................... 24  
Other Specific Products ............................................................................................................. 25  
Contributions within the Discipline ......................................................................................... 25  
Contributions to Other Disciplines ........................................................................................... 25  
Contributions to Human Resources ........................................................................................ 25  
Contributions to Resources for Science and Technology ....................................................... 26  
Contributions beyond Science and Engineering ..................................................................... 26  
APPENDIX: EVALUATION REPORT ..................................................................................... 27
Participant Individuals

Principal Investigator: Ann Q. Gates

Co-Principal Investigator(s): Nestor J Rodriguez; Malek Adjouadi; Desh Ranjan; Mohsen Beheshti

Senior personnel(s): Richard A. Alo'; John Fernandez; Alex Ramirez; Domingo Rodriguez; Nayda Santiago; Karen Villaverde

Other senior personnel: Miguel Figueroa; Ongard Sirisaengtaksin; Jianchao Han; Antonia Boadi; Phyllis Tedford; Liza Wisner; Heather Thiry; Sarah Hug; Kay Roy; Steve Roach; Eric Freudenthal; Elsa Villa

Other: Mary Contreras and Matthew Ross

Detailed Description

Gates Q Ann: Principal Investigator
Has worked for more than 160 hours: Yes
Contribution to project: Ann Gates (UTEP) coordinates the collective activities and initiatives of the Alliance, manages the general budget of the Alliance, and coordinates the undergraduate research initiative. She oversees the UTEP activities and chairs the CAHSI Executive Council. She receives support from BPC.

Rodriguez J Nestor: CoPrincipal Investigator
Has worked for more than 160 hours: Yes
Contribution to project: Nestor J. Rodriguez (UPRM) is a member of the Executive Council, and he oversees the following CAHSI initiatives: Development Workshops, Annual Meeting Research Poster Session, and CAHSI Lecture Series. He receives support from BPC.

Adjouadi Malek: CoPrincipal Investigator
Has worked for more than 160 hours: Yes
Contribution to project: Malek Adjouadi (FIU) oversees the development of the CAHSI website, and he oversees the student intervention activities at FIU pertaining to the project. He receives support from BPC.

Ranjan Desh: CoPrincipal Investigator
Has worked for more than 160 hours: Yes
Contribution to project: Desh Ranjan (NMSU) oversees the student intervention activities at NMSU pertaining to the project, including CS0, undergraduate research and PLTL. He receives support from BPC.
Beheshti Mohsen: CoPrincipal Investigator
Has worked for more than 160 hours: Yes
Contribution to project: Mohsen Beheshti (CSUDH) co-leads the CS0 intervention and oversees the intervention activities at CSUDH. These include CS0, PLTL, and undergraduate research. He receives support from BPC.

Fernandez John: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: John Fernandez (Texas A&M Corpus Christi) serves on the CAHSI Executive Council. He oversees the following interventions at TAMUCC: undergraduate research, CS0, and PLTL. He receives support from BPC.

Ramirez Alex: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Alex Ramirez (Hispanic Association for Colleges and Universities) leads the Social Science Network and the collaboration with the IBM Academic Initiative. He receives support from BPC.

Rodriguez Domingo: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Domingo Rodriguez (University Puerto Rico Mayaguez) co-leads the Development Workshops effort. He receives support from BPC.

Santiago Nayda: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Nayda Santiago (University of Puerto Rico Mayaguez) co-leads the undergraduate research effort and the Development Workshops. She receives support from BPC.

Villaverde Karen: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Karen Villaverde (New Mexico State University) is teaching the CS0 course. She is supported from BPC funds.

Aló Richard: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Richard Aló (University of Houston-Downtown) leads the PLTL effort and co-leads the CS0 intervention; he receives support from BPC.

Figueroa Miguel: Senior personnel
Has worked for more than 160 hours: No
Contribution to project: Miguel Figueroa leads the PLTL intervention at UPRM. He does not receive support from BPC.

Sirisaengtaksin Ongard: Senior personnel
Has worked for more than 160 hours: Yes
Contribution to project: Ongard Sirisaengtaksin is in charge of developing CS0 and PLTL for computer science at UHD. She receives BPC support.

Han Jianchao: Senior personnel  
Has worked for more than 160 hours: Yes  
Contribution to project: Jianchao Han is the PLTL and research faculty advisor at CSUDH. He received BPC support.

Boadi Antonia: Senior personnel  
Has worked for more than 160 hours: No  
Contribution to project: Antonia Boadi is the CS0 faculty facilitator at CSUDH. She received BPC support.

Tedford Phyllis: Senior personnel  
Has worked for more than 160 hours: Yes  
Contribution to project: Phyllis Tedford is the CS-0 Instructor and PLTL coordinator at TAMUCC. She receives BPC support.

Roy Kay: Senior personnel  
Has worked for more than 160 hours: Yes  
Contribution to project: Kay Roy is the CS-0 Instructor at UTEP. She does not receive BPC support.

Freudenthal Eric: Senior personnel  
Has worked for more than 160 hours: No  
Contribution to project: Eric Freudenthal is the CS-0 coordinator at UTEP. He does not receive BPC support.

Roach Steve: Senior personnel  
Has worked for more than 160 hours: No  
Contribution to project: Steve Roach is the PLTL coordinator and ARG leader at UTEP. He does not receive BPC support.

Villa Elsa: Senior personnel  
Has worked for more than 160 hours: No  
Contribution to project: Elsa Villa is a PLTL facilitator at UTEP. She does not receive BPC support.

Wisner Liza: Senior personnel  
Has worked for more than 160 hours: No  
Contribution to project: Liza Wisner is a program coordinator for the BPC grant at TAMUCC. She receives funds from BPC.

Thiry Heather: Senior personnel  
Has worked for more than 160 hours: Yes  
Contribution to project: Heather Thiry is one of the two External Project Evaluators. She receives funding from BPC.

Hug Sarah: Senior personnel  
Has worked for more than 160 hours: Yes  
Contribution to project: Sarah Hug is one of the two External Project Evaluators. She receives funding
Organizational Partners

The Hispanic Association of Colleges and Universities (HACU) is a founding partner with CAHSI. Through its membership of over 200 HSIs, and nearly 200 additional Associate and Partner member institutions, it provides CAHSI a conduit to other HSIs and other research and teaching institutions with a demonstrated interest in advancing Hispanics in higher education, including an international membership and a developing Hispanic-Serving School District membership. It shares with CAHSI its relevant programs, partnerships and information in support of our common goals, such as the support and development of the CAHSI Social Science Network through the HACU Hispanic Higher Education Research Collective (H3ERC), additional opportunities for engagement in cyberinfrastructure through the Minority-Serving Institution Cyberinfrastructure Empowerment Coalition (MSI-CIEC).

The IBM Academic Initiative program provides academia with access to software, hardware, workshops, training, tools, books, and discounts with the goal of improving student preparation for information technology and jobs in computing. CAHSI institutions have benefited from being involved with the Academic Initiative Program, in particular its workshops, its advisory role to the individual CAHSI institutions, and the benefits from open standards and open source. Irene Roberts, IBM Master Inventor and Program Director of ISV & Developer Relations (Technical Enablement IBM Innovation Center) serves on CAHSI’s Board of Advisors. At the California State University, Dominguez Hills, 12 courses were taught reaching 360 students and five faculty. At Florida International University, 56 courses were taught using open source, open standards and IBM technologies enrolling 1846 students and involving 12 faculty. At New Mexico State three faculty were enrolled in AI. At the University of Houston-Downtown, AI met with CS chair Ongard Sirisaengtaksin, a SOA workshop for faculty and students was setup, and six courses were taught using open source, open standards and IBM technologies enrolling 450 students. The University of Puerto Rico, Mayaguez, continued its work with AI holding an Open Source workshop, including AI in the LA Grid effort, and teaching nine courses using open source, open standards and IBM technologies enrolling 250 students. AI delivered a technical SSME workshop with a focus on SOA for faculty and students at the University of Texas at El Paso where nine courses using open source, open standards and IBM technologies were taught enrolling 375 students. AI presented a workshop in November 2008 on software configuration management.

Hewlett Packard has representation on CAHSI’s Board of Advisors

Microsoft has representation on CAHSI’s Board of Advisors

ATLAS Assessment & Research Center: Collaborative Research Personnel from the ATLAS Assessment & Research Center, located at the University of Colorado-Boulder, are in charge of the evaluation of the project.

Google has participated with CAHSI by supporting a speaker for the CAHSI Lecture Series. Google is also hosting the 3rd CAHSI Annual Meeting in January 2009.
Sun Microsystems provided a speaker for the CAHSI Lecture Series and for the CAHSI 3rd Annual meeting. Sun is also providing mentoring and advising for graduate and undergraduate students. Sun's Global Diversity and Inclusion Group directed by Shari Slate funded Dr. Gilda Garreton’s trip to the CAHSI 2nd Annual meeting as an opportunity to explore possible partnerships with institutions involved in CAHSI. Collaboration in such events benefits the industry because it can help with the recruiting and demonstrates how companies support volunteer works done by their employees.

State Farm has been active at CAHSI functions. In 2008, State Farm made a contribution to UTEP to support the CAHSI undergraduate research effort and outreach initiatives.

**Other Collaborators or Contacts**

Miami Children’s Hospital - Through the Brain Institute and the Joint Neuro-Engineering and Computing Program with FIU, MCH has contributed a joint faculty line in the area of optical imaging, on-site research space for neuroscience studies, and has hired one of our doctoral students, Dr. Mercedes Cabrerizo, who is now the Ware Foundation Research Fellow at the Brain Institute.

There are a number of contacts from industry and government agencies who support CAHSI goals:
- Rockwell Collins
- Lockheed Martin
- Department of Homeland Security

The following organizations are currently working with CAHSI on joint efforts:
- Society for the Advancement of Chicanos and Native Americans in Science (Executive Director, Judit Camacho): workshops, research poster participation, research sessions in computing
- GEM Consortium (Executive Director, Michele Lezama - National Consortium for Graduate Degrees for Minorities in Engineering and Science: internships, workshops, and scholarships
- Society for Hispanic Professional Engineers (President, Diane Gomez): Scholarships for CAHSI students to attend the Regional Leadership Development Conference and the GEM Consortium Grad Lab
- STARS Alliance (PI, Teresa Dahlberg): Exchange of ideas; participation and delivery of workshops
- Alliance for the Advancement of African-American Researchers in Computing (Maureen Biggers): adoption of Affinity Research Group model
- New Image of Computing: Serve on Board of Advisors; vetting material geared toward young Latinas through CAHSI female students
- Mentor-Net (contact: Raymond Rose): Exchange of ideas; identifying ways to collaborate regarding PaperNet and having a presence in MentorNet
- LiC-Latinas in Computing (Anita Borg Institute; support and mentoring for Hispanic women; collaborate on dissemination of information and presentations of panels and workshops)

CAHSI has had contact with the following individuals in 2008:
- Manuel Perez Quinones, Associate Professor Virginia Tech, broadening participation efforts; interest in adoption of ARG
- Jeff Wright, Dean of Engineering, University of California Merced: potential member of CAHSI
- Paco Flores, Hispanic Scholarship Fund: presentation at CAHSI 3rd Annual Meeting, and possible collaborations
- Zhixiang Chen, Chair of CS at UT Pan American: involving two faculty members in the CAHSI 3rd Annual Meeting (Pearl Brazier, Andres Figueroa)
Research and Education Activities

This section is divided as follows:

A. CAHSI Initiatives
B. Resource Development
C. Collaborations
D. Social Science Network

A. CAHSI Initiatives

CAHSI is implementing a variety of interventions that support students at critical stages in the academic pipeline: the transition from high school to college, from college to graduate school, and from graduate school to the professoriate. These interventions have been chosen to address key causes of under-representation of Hispanics in computing. The interventions are: CS0, PLTL, Undergraduate Research, and Faculty and Student Development.

CS0

The CS0 effort focuses on adoption of a pre-CS, three-unit course that uses graphics and animation to engage and prepare students who have no prior experience in computing. Students are provided with the opportunity to learn the basics of programming concepts and to develop problem solving and systemic reasoning skills, while becoming familiar with a programming environment. The intervention addresses the need to attract students to the discipline and the lack of preparedness of students to succeed in the first computer science course. Two approaches are being used: one that uses Alice and another that uses Python. Mohsen Beheshti (CSU-DH) and Richard Aló (UHD) lead this effort.

CAHSI institutions in the past year have offered a number of CS0 courses:

- Dr. Karen Villaverde (NMSU) taught a CS0 course titled "CS209: Computer Animation" in the Spring and Fall 2008 semesters. The course does not have any CS/Math prerequisites.
- Dr. Villaverde (NMSU) taught a version of the "Computer Animation" course in a 5-week Summer course to a group of high school women for the "Young Women in Computing" program that is supported at NMSU through a BPC supplement to a NSF MII grant. At the end of the course, the students completed a project where they created a game using Alice.
- Ms. Phyllis Tedford (TAMU-CC) taught two sections of CS0 in Spring and Fall 2008. She fully developed the CS-0 course based on material from the Alice Institute at Carnegie Mellon University.
- Antonia Boadi taught two section of CS0 in spring and fall 2008, one section each semester. During spring 2008 ALICE was used to implement the objectives of the course and MatLab was used for fall 2008. The change in the programming language was made based on students’ comments on having difficulties with ALICE software.
- In spring and fall 2008, UHD offered three sections of CS0 each semester. These sections used ALICE to implement the objectives of the course. It was used both for general education credit requirements and for non CS credit entry.
- In spring and fall 2008, UTEP offered three sections of CS0 each semester, each course taught by Kay Roy. One course (CS1310) targets Liberal Arts and Nursing students. The second course (UNIV1301) is the university’s freshman cohort seminar and is a core curriculum course at UTEP. The course has similar goals as CS1310 and uses Python as the language. The UNIV1201course differs in that it incorporates the following goals that are common to all Univer1301 courses: to strengthen academic performance and facilitate student’s transition to college; enhance academic skills; increase student interaction with both faculty and peers; to encourage student’s self-assessment and goal clarification; and increase student’s involvement at UTEP. UTEP offered two sections of UNIV301 each semester in 2008.

TAMU-CC engaged in an aggressive advertising campaign during Fall 2007 to announce the availability of the course in Spring 2008. During the freshman orientation session in summer 2008, any incoming freshmen were encouraged to enroll in the CS-0 course for Fall 2008 if they either did not meet the math requirement.
for CS-1 or felt uneasy about having no prior programming experience. They have plans to hold an Alice workshop for educators during June 2009 in conjunction with Carnegie Mellon University and funded by an NSF CCLI grant. The workshop will target community college and high school teachers, however any educator may apply. The hope is to train one or two more faculty at TAMUCC at this workshop to expand the available pool of people trained in the CMU approach to using the Alice programming environment.

CSUDH has promoted CS0 through a new program that it’s offering. CSUDH is a member of the RISSC alliance, an NSF ATE-funded alliance that involves two other CSU campuses and two community colleges. The focus of this alliance is Information Security and the transition of community college students to 4-year institutions. CSUDH designed a new program Bachelor of Arts in Computer Technology (BACT) in fall 2008 to help students with associate degree at community colleges complete their four year degree majoring in Computer Technology. The program has CS0 as one of the required courses for its tracks. We will be observing whether CS0 attracts BACT students to join the CS program. CSUDH is also planning to host a CS0 workshop during next academic year to promote CS0 to community colleges and high school teachers. The efforts will be partially support by an NSF ATE grant.

UHD has written a preliminary proposal jointly with the Houston Community College System Southwest campus to implement CS0 into their computer technology and computer science curricula in conjunction with other initiatives to implement a newly proposed Technologist track. This was submitted to the ATE Directorate at the National Science Foundation with Richard Alo’ as co PI. UHD was awarded a NSF BPC SGER grant to study the Transitioning of Students into Computing. This grant is in conjunction with HCCS, Dr. Bart Sheinberg who is co PI and Dr. Diane Baxter of San Diego Supercomputing Center is another co PI. One element proposed is the inclusion of CS0 as an effective transitioning tool.

UTEP, under the leadership of Eric Freudenthal, has redesigned the Python course being taught for CS0. Based on the observation that STEM and professional (e.g., nursing) students are engaged by different aspects of the course, the course now focuses on the use of programming to simulate physical systems in a manner that exposes the relationship between mathematics and the ”real-world”. The original course developed by Guzdial targets Liberal Arts students and focuses on aesthetic creation, and the UTEP version was revised for pre-engineering students who appear to be more engaged by projects that reveal technical concepts. Leadership in the engineering college is excited about these developments, and we have been invited to contribute to the development of a college-wide pre-engineering curriculum.

The CS0 co-leaders have been promoting adoption of CS0 at FIU and UPRM. CAHSI members have published numerous papers on CS0. See publication section of the report.

Peer-Led Team Learning - PLTL

The PLTL effort is creating and disseminating materials for key CS courses. A proven strategy for retention, PLTL provides an active learning experience for students, and creates leadership roles for undergraduates. 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 effort supports academic performance and retention in the gatekeeper courses.

The activities of the PLTL efforts at CAHSI institutions follow:

- Beginning January 2008, PLTL has been funded through a grant from the Texas Workforce Commission Youth in Technology Project (Award #: 2208WSW001). The grant will remain in effect until August 2009. During the spring 2008 semester, there were 9 peer leaders for four sections of CS-1 and three sections of CS-2. All courses, except those with low enrollments, were assigned two peer leaders; it was realized, however, that peer pairs provide a positive impact on the efficacy of the sessions, and it is better to have peer pairs even in the smaller classes. It is also a good recruitment tool when encouraging more students to apply as peer leaders.
- UPRM professor Dr. Pedro Rivera attended the PLTL conference celebrated in New York this summer. He will be integrating PLTL on a programming languages course in spring 2009. He is in the process of training three PLTL leaders for this course.
In spring and fall 2008, UHD offered PLTL for mathematics students and now preparing to offer PLTL to science and computer science students. Dr. Ongard Sirisaengtaksin is preparing materials for CS0 and CS1 offerings.

In spring 2008, CSUDH started offering PLTL for CS1 and CS2. Dr. Jianchao (Jack) Han is the PLTL faculty who trains PLTL leaders and oversees the overall scheduling of workshops and their performance. In fall 2008 CSUDH continued offering PLTL for CS1 and CS2 and also starting PLTL for pre-calculus to assist students who are having difficulties with the course.

TAMU-CC employed PLTL leaders in spring and fall 2008. The intervention was conducted in all sections of CS1 and CS2. Funding for peer leading was provided by the Texas Workforce Development Commission. The location for the materials that have been developed at TAMU-CC follows: http://www.sci.tamucc.edu/~pltl/peerLeaderIndex.html.

UTEP employed PLTL leaders in spring and fall 2008. The intervention was conducted in CS1, CS2, and CS3. Funding for peer leading was provided by the Texas Workforce Development Commission. The location for the materials that have been developed at UTEP follows: http://robust.cs.utep.edu/PLTL/.

As described earlier, UHD wrote a preliminary proposal jointly with the Houston Community College System Southwest campus to implement CS0 and PLTL in conjunction with other initiatives to implement a newly proposed Technologist track. UHD is still working with UH Central Campus to incorporate PLTL into the Houston Lewis B Stokes Alliance for Minority Participation program offerings. The co-leaders are promoting adoption of PLTL at FIU and UPRM. Also, UHD promoted the national PLTL conference in July in New York for the PLTL faculty of which one attended.

**Undergraduate Research - Affinity Research Groups**

The Affinity Research Group (ARG) model and an undergraduate research course are two efforts that emphasize the development of student research and professional skills. The ARG model provides both undergraduate and graduate students with opportunities to learn, use, and integrate the knowledge and skills that are required for research with those required for cooperative work. The research course incorporates ARG components and focuses on three fundamental aspects that have been identified to contribute to success of undergraduate research: research methods, experimentation and validation, and technical writing and presentations. The undergraduate research intervention targets the retention and advancement of students into graduate school.

The activities at each adopting CAHSI institution are as follows:

- Dr. Desh Ranjan, Dr. Joe Song, Dr. Jing He, and Dr. Karen Villaverde have been using the ARG model for their research groups. The following students worked on their research and were supported with the CAHSI grant.
  - Gregorio Hinojosa worked under the direction of Dr. Desh Ranjan and developed some basic computational tools for analyzing sequence data.
  - Katherine Dollahon, Daniel Dominguez, and Gina Hume worked under the direction of Dr. Karen Villaverde on Game Design and Development.
  - Erick Rosas worked under the direction of Dr. Jing He on Bioinformatics. Erick published two research posters (see publications)
  - Curtis Luce and Samuel Palmer worked on Bioinformatics under the direction of Joe Song. They published the following papers and posters (see publications)

- UHD implemented the ARG model through its REU program. In summer 2008, there were four students and one faculty member engaged whereas in fall 2008 there were ten students and three faculty members engaged. Dr. Shantuan Coleman, Director of the MSI CyberInfrastructure Empowerment Coalition conducted three seminars for these students.

- In spring 2008, CSUDH continued with its work in Affinity research Group at its Computer Security Research Lab (CSRL). Computer Science Faculty members and nine undergraduate and graduate students are currently part of this group. Students have published and presented at university, state and international conferences.

- TAMU-CC has implemented the following ARGs:
SECURITY AND NETWORKING RESEARCH GROUP (SNRG): The Security and Networking Research Group (SNRG - pronounced as "Synergy") of the Department of Computing Sciences is devoted to seeking and developing applications of new networking technology, investigating and developing secure communication protocols in advanced networks, and providing scholarly support for networking and security to other research and development entities within the university; Faculty Lead is Dr. Dulal Kar and other faculty include Dr. Mario Garcia, Dr. Ajay Katangur, Dr. Ahmed Mahdy; there are 5 students involved.

COMPUTER-HUMAN INTERACTION RESEARCH GROUP: The Computer-Human Interaction research group develops innovative computer-human interfaces and new techniques for conducting system evaluations; Faculty Lead is Dr. Scott King and other faculty are Dr. Hongyu Guo, Dr. John Fernandez, and Larry Young; there are 5 graduate students and 9 undergraduate students involved.

COMPUTING SYSTEMS AND MACHINE INTELLIGENCE RESEARCH GROUP: The Computing Systems and Machine Intelligence research group conducts research on algorithms and tools for efficient access and discovery in large, heterogeneous and distributed parallel computing systems, and text and multimedia databases. Faculty Lead is Dr. Michael Scherger with Dr. Longzhuang. There are two undergraduate students in this research group.

- UTEP CS has been using the ARG model for over ten years. The research groups using ARG are as follows: Using Cyberinfrastructure to Share Resources to Advance Research and Education (Cyber-ShARE) (Drs. Rodrigo Romero and Ann Gates); Software Engineering Affinity Lab (Drs. Steve Roach and Ann Gates); Theoretical Research and Applications in Computing (Drs. Kreinovich, Longpre, and Ceberio); Interactive Systems Group (Drs. Novick and Ward)

Other activities include the completion of an ARG handbook (http://computer.org/arg) in conjunction with NSF DUE-0443061and IEEE-Seed Initiative funding. Gates, Roach, and Villa delivered numerous workshops as documented below.

As part of the research experience, many institutions took undergraduate students to conferences, e.g., TAMU-CC took a cohort of students to the SACNAS 2008 conference and the SIGGRAPH conference, and UPRM took a cohort of female students from the FemProf program to the Grace Hopper 2008 Conference. Undergraduate research students also participated in the 4th Annual LSAMP Symposium held at NASA in Houston, TX.

Faculty and Student Development

Under the coordination of Drs. Domingo Rodriguez and Nayda Santiago, development workshop sessions have been organized for CAHSI Annual Meetings, which are attended by students and faculty from all CAHSI institutions. Evaluation forms will be given to the participants for each of the workshop to assess the delivery of the workshop and the learning experience. In addition, other CAHSI members have offered workshops and panels at conferences throughout the year. A summary is included below:

- **Introduction to Research** (Presented: 12-15-07 at the CAHSI 2nd Annual Meeting) Presenter: Nayda Santiago (UPRM)
  Description: This workshop discusses different aspects involving research: Why is it necessary to publish? What is systematic research in computer science? What is a proper experiment design?

- **Affinity Research Group Workshop** (Presented: 12-15-07 at the CAHSI 2nd Meeting; 09-12-08 at the STARS Celebration; Frontiers in Education Conference, 10-22-08; University of Nebraska-Omaha, 11-21-08) Presenters: Ann Q. Gates, Steve Roach, and Elsa Villa
  Description: An Affinity Research Group is a comprehensive model for the creation and maintenance of dynamic, productive, and inclusive research groups in engineering and computing. The model is comprised of a set of fundamental principles and effective practices that emphasize the conscious development of students’ domain knowledge as well as research and professional skills. This workshop introduces the model and engages the participants in exercises that illustrate the use of the model.

- **Young Faculty Success Strategies** (Presented: 12-16-07 at the CAHSI 2nd Annual Meeting) Presenter: Irma Becerra (FIU)
Description: Faculty seeking professional career development in research and education will benefit from best practices and collected wisdom for identifying resources and strategies for success in academia.

- **SHPE Regional Leadership and Development Workshops**
  Description: The SHPE conference was held on April 4, 2008, and it presented numerous workshops on leadership. It was held to promote the development of Hispanics in engineering, science and other technical professions to achieve educational excellence, economic opportunity and social equity. The students were able to meet other students in their field and that will benefit them as they continue to network and established contacts with students in their field.

- **SHPE/GEM Grad Lab** (Presented: 4-4-08 at the SHPE Regional Conference) Presenters: Jacqueline Thomas (GEM), Ann Q. Gates (UTEP), Steve Castillo (NMSU), and Yvonne Lopez (UTEP)
  Description: The workshop was presented to UTEP and CAHSI undergraduate students. Students hear personal stories from Hispanic PhDs about their path to the doctorate. In addition, the workshop discusses choosing a graduate program, preparing an application, writing a statement of purpose, and seeking letters of recommendations.

- **Preparing for an Advanced Degree: Life after the BS/BA** (Presented: 10-3-08 at the Grace Hopper 2008 Conference) Presenters: Jacqueline Thomas (GEM), Gilda Garreton (Sun Microsystems), Cecilia Aragon (Lawrence Berkeley Labs), Patricia Lopez (Intel), Ann Q. Gates (UTEP)
  Description: The workshop was divided into two parts. The first part discussed the value of graduate studies, choosing a graduate program, and the application process. The second part presented voices from the field to share experiences with female students in computing. The panel described why they chose to go to graduate school, the barriers that they faced, and how they overcame them.

- **Preparing for Success in Advanced Studies** (Presented: 10-11-08 at the SACNAS 2008 Conference) Presenters: Jacqueline Thomas (GEM), Gilda Garreton (Sun Microsystems), Ann Q. Gates (UTEP), Patricia Lopez (Intel)
  Description: The workshop targets undergraduate students. Students hear personal stories from Hispanic PhDs about their path to the doctorate. In addition, the workshop discusses choosing a graduate program, preparing an application, writing a statement of purpose, and seeking letters of recommendations.

- **Data Management Techniques in Cyberspace** (Scheduled 1-18-09 at the CAHSI 3rd Annual Meeting, Google) Presenter: Manuel Rodriguez – University of Puerto Rico at Mayaguez.
  Description: The Internet has become a valuable tool for scientists and engineers to publish data collections produced as part of their research projects. Nowadays, we can find several terabytes of data from Biological experiments, Geospatial instruments, atmospheric observations, and so on. These data collections are often replicated to increase their availability and reliability. Likewise, there are many software tools and computing environments necessary to process and analyze these data in order to generate new knowledge. Many of these computing resources are replicated as well, although this replication might be more in terms of functionality rather than exact computational software and hardware. This workshop introduces participants to data management techniques and the types of challenges that are often encountered in cyberspace.

- **Algorithm Partitioning for Distributed Hardware Architectures** (Scheduled 1-17-09 at the CAHSI 3rd Annual Meeting, Google) Presenter: Rafael Arce, University of Puerto Rico at Rio Piedras.
  Description: Tools and methodologies that assist in mapping to distributed architectures are of paramount importance in helping programmers and scientists take full advantage of the available hardware technology. This workshop will present methods and tools for mapping algorithms to distributed hardware architectures such as the evolving multicore systems. The workshop will address issues such as the development of objective functions for partitioning optimization and performance estimation and the design of heuristics for algebraic-level exploration.

- **Selling Yourself and Your Ideas** (Scheduled 1-17-09 at the CAHSI 3rd Annual Meeting, Google) Presenters: Cecilia Aragon (Lawrence Berkeley Labs), Dilma da Silva (IBM T J Watson Research), Gilda Garreton (Sun Microsystems), Nayda Santiago (URPM)
  Description: A panel of researchers and program managers from academia, government, and industry will discuss what works and what does not work in obtaining funding for research. Panelists will represent the three perspectives on funding:
  - Industry: patents, white papers, internal funding; the "patent vs. publish vs. trade secret" decision
• Government: proposals, living on soft money, publications
• Academic: proposals (research, education, equipment)

• Applying to Graduate School and Scholarships ( Scheduled: 1-15-09 at the CAHSI 3rd Annual Meeting) Presenters: Michele Lezama (GEM), Jacqueline Thomas (GEM), and Paco Flores (Hispanic Scholarship Fund)

The National GEM Consortium and the Hispanic Scholarship Fund are sponsoring a workshop designed to excite and encourage promising undergraduate engineering and science students to consider master and PhD technical research programs. The workshop will encourage students’ consideration of graduate engineering school by delivering vital information on the importance of research and innovation, the process of choosing a graduate program and preparing an application. The workshop will end with a discussion of applying for scholarships through the GEM Consortium and the Hispanic Scholarship Fund.

• Becoming a CAHSI Advocate ( Scheduled: 1-17-09 at the CAHSI 3rd Annual Meeting) Presenters: Ann Gates (UTEP) and Luis Martinez (Scripps Research Institute)

Make an impact by becoming a CAHSI advocate! This interactive workshop will prepare students and faculty in becoming an advocate. Student advocates work with students at their home institutions by encouraging and facilitating student participation in REU opportunities, seminars, workshops, and internships. Working with faculty, they involve students in activities that assist them in preparing competitive applications to local and external programs and scholarships. The role of faculty advocates is to promote Hispanic faculty and young professionals into leadership roles. This includes award nominations and making recommendations for key committee positions, panels, and other positions that build leadership.

A CAHSI Lecture Series was started during the past spring semester. The goal of the lecture series is to disseminate new developments and research in computing among CAHSI institutions and the computing research community at large. The lectures are broadcasted through video streaming, recorded and made available to the scientific community through the CAHSI website. A description of the five lectures that have been offered follow:

• Research in Industrial Labs: How Collaboration Aids Innovation (Presenters: Tarik Ono and Gilda Garreton, Sun Microsystems)

Description: Using the example of Sun Microsystems Laboratories, this presentation shows how research in industrial labs often spans multiple research areas and encourages close collaboration between groups. We will focus on one particular innovation that was made possible by a joint effort of hardware and software engineers, namely Proximity Communication, a novel low-power chip-to-chip communication method developed at Sun Microsystems Laboratories. Furthermore, the presentation will explain the research and circuit design flow process that lead to the development of functional test chips. It will also emphasize the relevance of an in-house open-source CAD tool as well as interactions with external partners.

• Connecting Dots in a Flat World (Presenter: Juan Vargas, Google Corp.)

Description: We created a technological infrastructure that has transformed our lives. Immense volumes of data are being captured by instruments, satellites, and sensors, 24/7. Huge data sets are available to scientists, engineers, governments, the military, and the private sector. Areas such as bioinformatics, drug discovery, nano-engineering, healthcare, e-commerce, require unprecedented levels of cooperation between experts from a variety of fields. At the new frontiers of engineering, science and technology, the new generation of scientists and engineers must be trained to listen to and learn from others. We must learn to collaborate in order to devise the new methods, technologies and insights needed to support such distributed networks of research. Computing is the driving force, at the center of this fundamental change. During this talk I will offer my personal (and optimistic) view on the future of computing and the intersection with the sciences, and will discuss areas that I think offer greater opportunities.

• Service-Oriented Wireless Network (Presenter: Kejie Lu, University of Puerto Rico at Mayaguez)

Description: Over the past decade, wireless networks have significantly changed the life of everybody. In this presentation, we will first briefly review existing wireless networking technologies, such as different generations of cellular networks, wireless local area networks (WLANs), and wireless sensor
network (WSN). We will then focus on the design of future wireless network, in particular the design based on the service-oriented principle. A general framework for the service-oriented design will be presented. Within this framework, a number of research topics will also be discussed.

- **Sunfall: Visual Analytics for Astrophysics** (Presenter: Cecilia Aragon, Lawrence Berkeley National Laboratory)
  Description: Sunfall is a production visual analytics system that accelerates science discovery by utilizing novel interactive visualization and analysis techniques to facilitate insight into complex, noisy, high-dimensional, high-volume, time-critical scientific data. Sunfall was designed and implemented by a multi-disciplinary team of computer scientists and physicists for the Nearby Supernova Factory, an international astrophysics experiment that is the largest data volume supernova search currently in operation. The Sunfall system combines novel image processing algorithms, statistical analysis, and machine learning with highly interactive visual interfaces to enable collaborative, user-driven scientific exploration of supernova image and spectral data. Now in operation at the Nearby Supernova Factory, Sunfall is the first visual analytics system in production use at a major astrophysics project. Project scientists estimate that Sunfall has reduced the data collection, processing, and management effort from 6 FTE to .75 FTE overall, freeing scientists to focus on science discovery. Additionally, by making previously unworkable scientific tasks possible, Sunfall has enabled scientists to attain new insights into their scientific data.

- **A Direct Constrained Optimization Method for Solving the Kohn - Sham Equations**  
  (Presenter: Dr. Juan Meza, Lawrence Berkeley National Laboratory)
  Description: Research of nanostructures requires *ab initio* materials simulations to compute ground state energy and single-particle many-electron atomistic system wave functions. Simulation cores, which are typically based on Self-Consistent Field iteration, may fail if a particular surrogate minimizes increases total energy. We propose an optimization that minimizes the Kohn-Sham total energy directly. A trust region technique is introduced to restrict wave function updates within a small neighborhood of an approximate solution.

Poster sessions at the CAHSI annual meeting provide an opportunity for students to present their research and to receive feedback. The session also provides an opportunity for highlighting the quality of research being conducted at HSIs, for networking, and for identifying possible collaborations. CAHSI encourages students to present posters at other venues. A summary of the poster presentations are given below:

- **Third CAHSI Annual Meeting Poster Session**
  Graduate and undergraduate students from seven CAHSI institutions and three non-CAHSI institutions have submitted over fifty poster proposals. Proceedings with short papers of the posters will be produced as a means of dissemination of ongoing research conducted by CAHSI students. An electronic version of the proceedings as well as the posters is available on the CAHSI website (http://www.cahsi.org).

- **CISE Ph.D. Program at UPRM Poster Sessions**
  During the fall semester the Ph.D. program in Computing Information Sciences and Engineering (CISE) at UPRM celebrated with a special research poster session. These posters have been posted on the CISE website (http://cisephd.uprm.edu).

- **TAMUCC – Eight Annual Undergraduate Research Symposium**
  The Eighth Annual Texas A&M University-Corpus Christi Undergraduate Research Symposium was held on Saturday, November 1, 2008 in the University Center Ballroom. The students presented both oral and poster presentations. The topics were in life sciences, physical sciences, mathematics, computer science, engineering technology, and GIS. This symposium also highlighted the important role faculty mentors play in guiding students as they explore new ideas and find the voice to express them as denoted by student remarks: “It was good to hear the types of questions judges ask and to see all the interesting topics presented.” “I like this event because I believe it helped me gain confidence with presenting research and talking in front of a crowd.”

Student- panel sessions are in the process of being organized for presentation at the CAHSI 3rd Annual Meeting. The objective of these sessions is to foster dialogue among students that could help the advancement of their careers in computing. A call for proposals was disseminated in October 2008. Panel
sessions consist of 3-4 students, not necessarily from the same institution, sharing valuable experiences on a particular topic followed by a dialogue with the audience. A summary of selected panels:

- **Challenges that Female Students Face in Computing Undergraduate Studies**
  Presenters: Yajaira González-González (UPRM), Adriana Meléndez-Bagué (UPRM), Joralis Sánchez-Solá (UPRM), Cristina Vigil-López (UPRM)
  Description: In modern society careers are still being stereotyped by gender. In computing and engineering females are a minority, which causes them to face many challenges while advancing in their studies and careers. These challenges take place in classrooms, in group projects, internships, family, and in their everyday life. Some of them are: being the only female in a classroom, lack of role models in the field, balancing family life, workload, and dealing with the underestimation of the women capabilities. The panelists will present solutions and ways to cope with these challenges that will be based on our own experience as students. Adriana will present the problem from the perspective of a married woman, president of an association, and student. Yajaira will give an insight of this problem based on her internship experiences. Joralis will view the problem from a computing student perspective. Cristina will present a literature review of the gender issues in computing. The panelists will ask the audience to share their experiences. The panel will end with an open discussion about ways to cope with the problems female faced as students.

- **Reshape the Image of Computing**
  Presenters: Aída Gándara (UTEP) and Sridurga Shilpa Ganapathineedi (NMSU)
  Description: In the last few years, incoming freshman have decreased in numbers for computer-related degrees, having a negative impact on society. For one, there is a loss of representation in an area that affects almost all members of society today. Second, how a community perceives the use and application of computers will affect how future generations of the community receive, leverage and disseminate the same information. The New Image of Computing project ([http://www.imageofcomputing.com/](http://www.imageofcomputing.com/)) is an NSF-funded project that is focused on innovating the image of computing to attract middle to high school Hispanic girls to computing. CAHSI is in a unique position to contribute to this project. This session will focus on commenting and critiquing the preliminary documentation that has been created for the Image of Computing project. The facilitators will engage the audience in sharing their perspectives and making suggestions on what types of changes or interventions might have helped them see a more attractive area of study. The results of the discussions will be provided to the New Image of Computing project.

- **Build Bridges and Wire up Your Career**
  Presenters: Mariel Chapa (Monterrey Institute of Technology), Alicia Chong (Monterrey Institute of Technology), Rosa Enciso (Monterrey Institute of Technology), Jocelyn Simmonds (Monterrey Institute of Technology), and Cynthia Treviño (Monterrey Institute of Technology)
  Description: It is not enough to have a degree and good grades to stand out in whatever we love to do. Success is achieved by finding the right opportunities or answers. However, chances do not show up by themselves. We need to be proactive and build bridges to prospects on our own, or better yet, through our network! In this panel, both undergraduate and graduate students will offer their insight in how networking has benefited them in saving time on class projects, and even in their Ph.D. research, and improving their writing and social skills. Also, the panelists will offer some ideas on how to find networking opportunities in your own school through student organizations, and outside in research and career conferences. They will also share some tips on how to make the most of a networking situation, how to start a conversation, and more importantly, how to maintain it. To keep your network strong, becoming a connection for your peers or colleagues and reciprocating favors is key.

- **Creativity meets no bounds: Defeating the Myth of the Cave**
  Presenters: Rogelio E. Cardona (UPRM), Ramón J. González Torres (UPRM), and Damián A. Torres Oliveras (UPRM)
  Description: Since humanity started roaming the earth, standards have been created for all activity. As effective as these molds may be they create the same results. So what did we do? Break the mold. In our world, dividing by zero is possible. Formality has met its match. Our discussions and brainstorming sessions happen amidst iPhone lightsaber fights, all the while making fun of each other and just keeping it as active as possible utilizing proved and unproved methods. All ideas, from the realistic to the unreal, from the conceivable to the incomprehensible are welcome without a judging
eye. Not only are our personalities varied, but our knowledge even more so; we come from all over the Electrical and Computer Engineering department into a melting pot that produces a diverse array of ideas that reflect our dreams. At the end we filter out ideas "Survivor" style where through debates we choose what ideas stay, and which go to the recycle bin, so we can finally move from dreams to reality. Learn how to replicate our experience with Damian talking about creative activities, Rogelio talking about how to keep things in order and Ramon discussing how to make the right decisions.

B. Resource Development

A major activity in 2008 was to organize CAHSI resources for dissemination and to serve as a resource for students and faculty. The effort has resulted in the CAHSI website: http://cahsi.org, the UTEP PLTL resources website: http://robust.cs.utep.edu/PLTL and the TAMU-CC website: http://www.sci.tamucc.edu/~pltl/peerLeaderIndex.html, the CS0 websites (http://csci.tamucc.edu/cs-0 and http://robust.cs.utep.edu:8080/cahsi/cs0-Python/). There is still much work to be done in organizing the information, updating the information, and validating the current information.

In order to support and sustain the initiatives described earlier, CAHSI member institutions have sought funding. A brief description of the grants that support and complement CAHSI efforts follow:

- TAMU-CC-Computing Sciences and Alliance for Minority Participation Program (CS/AMP) was developed to enhance and support the research fellowship partnerships between Texas A&M-Corpus Christi undergraduate students and faculty. CS/AMP research fellows are collaboratively funded under three grants: CAHSI-BPC, LSAMP, MII and TWD. Each are described briefly.
  - NSF LSAMP: Louis Stokes Alliances for Minority Participation. This program aims at increasing the quality and quantity of students successfully completing science, technology, engineering and mathematics (STEM) baccalaureate degree programs, and increasing the number of students interested in, academically qualified for and matriculated into programs of graduate study.
  - NSF MII: Improving the Pipeline in Applied Computer Science. This program focuses on the retention of qualified undergraduate students by providing appropriate financial support and mentoring activities. The goal is to involve students directly in ongoing faculty research projects and thus prepare them for graduate studies and research programs.
  - TWD: Texas Workforce Development. This program aims to increase the number of electrical engineering and computer science graduates from higher education institutions in Texas.

- UTEP and TAMU-CC- The NSF-funded CCLI Phase 2: Increasing Attractiveness of Computing: The Design and Evaluation of Introductory Computing Coursework that Elicits Creativity (investigators: Eric Freudenthal, Ann Gates, and John Fernandez): This grant allows UTEP and TAMUCC to further develop the CS0 intervention. The course is incorporating material on career choices. Advancements and results and results are being disseminated through CAHSI.

- UTEP received a Texas Workforce Development grant (Steve Roach, PI) to support PLTL in CS1, CS2, and CS3. The grant terminated in August 2008.

- URPM and UHD- The NSF-BPC-funded project entitled, "Paving the Road to Professorship for Female Students,” establishes a model program for significantly increasing the number of undergraduate female students that pursue a professorship in computing. The short-term objective of the program is to significantly increase the number of female students, in particular Hispanics, who continue doctoral studies in computing. The long-term objective is to significantly increase the number of female faculty in computing. Dr. Néstor J. Rodríguez from UPRM is the director of the project and Dr. Richard Aló is the UHD coordinator. Dr. Sangeta Gad, Dr. Nayda Santiago and Dr. Gladys O. Ducodray are CoPIs of the project. Currently the project supports seven computer engineering students, one computer sciences student and five electrical engineering students from UMPR, and 4 computer sciences students from UHD. The students have attended several workshops on research, career development and women issues. Twelve of them attended the Grace Hopper Conference and four attended the
GRAD Lab held at UTEP during the spring semester. This activity was cosponsored by the GEM Consortium, SHPE and CAHSI.

- CSUDH, Computer Science Department was awarded an NSF ATE grant as a Co-PI and a member of RISSLSC alliance, involving two other CSU campuses and two community colleges. The focus of this project is Information Security and transition of community college students to 4-year institutions. The new BACT program is designed to help students with associate degree at community colleges complete their four year degree majoring in Computer Technology. Many of these students will need to take CS0 as part of their requirements.

- CSUDH Computer Science Department was awarded an MRI grant to establish a Computer Cluster Lab for Student Research and Training to be utilized by the faculty and students in Computer Science as well as other departments within the College of Natural and Behavioral Sciences.

- UHD wrote a preliminary proposal jointly with the Houston Community College System Southwest campus to implement CS0 and PLTL into their computer technology and computer science curricula in conjunction with other initiatives to implement a newly proposed Technologist track. This was submitted to the ATE Directorate at the National Science Foundation with Richard Alo’ as co PI.

- UHD was awarded a NSF BPC SGER grant to study the Transitioning of Students into Computing. This grant is in conjunction with HCCS, Dr. Bart Sheinberg who is co PI and Dr. Diane Baxter of San Diego Supercomputing Center is other co PI. One element proposed is the inclusion of CS0 and PLTL as an effective transitioning tool. UHD is still working with UH Central Campus to incorporate PLTL into the Houston Lewis B Stokes Alliance for Minority Participation program offerings.

C. Collaborations

A significant effort was made in 2008 to begin the work on creating a unified effort to address the underrepresentation of Hispanics in STEM fields. One significant event was the America’s Competitiveness: Hispanic Participation in Technology Careers Summit (May 5-6, 2008 at IBM Palisades, NY) sponsored by IBM, Univision, Lockheed Martin, and Exxon Mobil. Irene Roberts (IBM) nominated Ann Gates as a representative of CAHSI to attend the summit sponsored. Gates participated in discussion groups that examined ways in which the community can unify to address the key issues of engaging Hispanics in STEM fields. The summit provided an opportunity to disseminate information about CAHSI and connect with other organizations, such as the Tomas Rivera Institute and Excelencia.

CAHSI is establishing strong ties with the National GEM Consortium, SHPE, MentorNet, and Latinas in Computing. CAHSI has been working with these organizations to present student workshops and recruit students to become involved with them. The following testimonial from Dr. Gilda Garreton (Sun Microsystems and one of the founding members of the Latinas in Computing effort) outlines the LiC collaboration:

The official collaboration between CAHSI (Computing Alliance of Hispanic-Serving Institutions) and LiC started in December 2007 when Ann Gates invited Gilda Garreton to participate in the second annual CAHSI meeting held in Miami, Fla. Her trip was funded by Sun’s Global Diversity and Inclusion Group directed by Shari Slate as an opportunity to explore possible partnerships with institutions like CAHSI. Collaboration in such events benefits the industry because it can help with the recruiting and demonstrates how companies support volunteer works done by their employees. The benefits of the CAHSI-LiC collaboration were realized when LiC established contacts with SACNAS and GEM, and CAHSI members received feedback from two LiC members, Gilda Garreton and Cecilia Aragon from Lawrence Berkeley National Laboratory (LBNC), while brainstorming about possible engagements with industry current and future partners. Since then LiC and CAHSI people have engaged in different activities and some are listed below.

- Provided CAHSI exposure to the Anita Borg Institute (ABI) and its associates
- Provided ABI members the opportunity to know more about CAHSI and its members.
- Collaborated to present a panel at GHC08 titled "Selling Your Ideas: Becoming a Successful Computing Researcher"
- Collaborated with GEM and CAHSI to present a panel on graduate school to SACNAS 2008 conference.
• Invited CAHSI senior people to become MentorNet mentors, and Ann Gates is one of them. MentorNet is an online mentoring organization where LiC has its own MentorNet portal to promote mentors for Latino population.
• Promoted CAHSI events such as April’08 SHPE/GEM Grad Lab and CAHSI Lecture Series among LiC/MentorNet members.
• Participated in CAHSI Lecture Series (Gilda Garreton and Tarik Ono, Sun Microsystems, and Cecilia Aragon from LBNL)

Finally, the opportunity to represent LiC in this collaboration has allowed Gilda Garreton to improve her communication and leadership skills. This does not only been a benefit her but also Sun Microsystems because the improved skills will also be applied in future work-related collaboration efforts.

D. Social Science Network
CAHSI established the Social Science Network, a network of social scientists who are interested in recruitment, retention, and advancement of Hispanic students and faculty in general and in science, technology, engineering and mathematics (STEM) and computing and information science and engineering (CISE) in particular, to “Enhance the understanding of CAHSI as to the causes and issues related to Hispanics entering, persisting and progressing in computing.”

BPC interventions and the students involved act within a larger social, cultural and institutional context. Students have many influences upon them, and BPC activities do not occur in a vacuum. It is seldom that any single program, intervention or activity may in itself result in an aggregate increase in recruitment, retention, or advancement even within a single discipline.

Having a broader social science context on research and evaluation models may provide help in understanding outcomes. They may also be helpful in revising and the continual improvement of a program, department or institution, or in devising entirely new and innovative programs, practices or policies. They are also helpful in increasing our overall understanding and provide suggestions for future programs and research. Brief reports were developed on models of specific focus on Hispanic or minority college students. These reports needed to be no more than one or two pages to make them more likely to be read by interested, but time limited faculty as well as by institutional or governmental administrators or industry executives also with very limited time and interest. The reports intended to quickly convey the essence of the model presented, its relevance to some CAHSI activities, and citations for more in-depth presentation. The brief reports are as follows:

1. The Louis Stokes Alliance for Minority Participation (LS-AMP) Model, Manuela Romero and Alexander Ramirez
2. The Model Institutions of Excellence (MIE) Model, Carlos Rodriguez and Alexander Ramirez
3. A Model of Exemplary Undergraduate Practices of HSIs with High Production of Future STEM Doctorates: Making the Pieces Fit, Marcel Quintana-Baker and Alexander Ramirez
4. The Nora Student Engagement Model, Maury Nora and Alexander Ramirez

Two NSF programs that have been generally regarded as quite successful are the Louis Stokes Alliance for Minority Participation (LSAMP) and the Model Institutions for Excellence (MIE). These programs have been extensively studied, and are briefly presented in the first two reports. Dr. Romero is very involved in the LSAMP program being the Executive Director of WiscAMP, the University of Wisconsin LSAMP program. Dr. Carlos Rodriguez, American Institutes of Research, is an evaluator of the MIE program and the developer of the MIE model.

Advancing Hispanics to the doctorate to become part of the next generation of the professoriate is a major concern for CAHSI and the NSF. To end the underrepresentation of Hispanics in computing and other STEM fields there is a strong need for faculty role models for Hispanic students. Becoming a faculty member starts at the undergraduate level. HSIs consistently produce 33% of STEM baccalaureates and are well represented
on the Top 50 baccalaureate origins of STEM Ph.Ds. The third brief report provides an introduction to an investigation done by Dr. Maricel Quintana-Baker of exemplary practices at some HSI baccalaureate origins of future STEM doctorates.

The theoretical understanding of student retention has proven to be complex and research has shown that ethnicity, or being Hispanic and the conditions of their situation, can influence the nature of student retention. Amaury Nora and colleagues have investigated the issues extensively, and have strongly influenced the field. The fourth brief report provides a brief introduction to Dr. Nora’s student engagement model for student retention.

Finally, a brief report on the Status of Hispanics in Computing was developed based upon the NSF Science and Engineering Indicators, 2008, and Women, Minorities and Persons with Disabilities in Science and Engineering update reports and the CRA Taulbee Survey. The preparation of this report also leads to a deeper analysis of the awarding of CS degrees by ethnicity and gender. This preliminary analysis found a difference in the pattern of degrees at the undergraduate level with the rate of increase for males, particularly non-Hispanic white males, being much greater than for females while the eventual decline took effect quicker for females while gender differences for Hispanics were less pronounced than for non-Hispanic whites. The brief report also included a list of useful web sites for seeking information about Hispanics.

The SSN reviewed the CAHSI evaluation report and future directions that CAHSI members are planning. The notion of mentoring continued to re-occur as it does throughout BPC efforts so much so that the term is bantered about with a variety of general meanings and operational definitions. Even the best instances are usually based upon “practitioner wisdom” and thus very idiosyncratic and difficult to meaningfully replicate. This may be in the nature of mentoring. To get a better handle on mentoring and its dimensionality an investigation of mentoring is being considered and developed possibly utilizing CAHSI institutions as test sites. Also, to further assist CAHSI with this issue, a virtual “conversation with a social scientist” is to be arranged where CAHSI members may interact with a social scientist and a practitioner regarding the research on and practice of mentoring.

The HACU Hispanic Higher Education Research Collective (H³ERC) this year focused upon another strategic area of concern to Hispanic success in higher education; that of, K-12 teacher preparation. The preparation of Hispanics to be effective teachers and role models, and the preparation of all teachers to be effective learning guides for Hispanic students is critical to better preparing the students for college and careers in STEM and other fields. It convened a number of national and leading experts in the field to develop a research agenda.

Findings
Please see the Appendix for the Evaluation Report

Training and Development

See the “Student and Faculty Development section” reported in "Research and Education Activities” for a description of the workshops delivered by CAHSI. A description of the Annual CHSI meeting, which is the main venue for training and development is described next.

SECOND ANNUAL CAHSI MEETING

This event was held on December 15-18, 2007 in Miami, Florida. The theme of the meeting was: Building Collaborations with Hispanic-Serving Institutions to Maintain U.S. Competitiveness in Science and Technology. It was to discuss how CAHSI and similar alliances can join government, industry, professional societies, and
other non-for-profit organizations can ensure that the U.S. maintains its critical edge in science and technology. The first two days of the meeting were devoted to graduate student and faculty workshops followed by a poster session on Sunday evening. The keynote speakers for the Monday meeting included Drs. Peter Freeman and Thomas Sterling. The keynote speaker, Dr. Freeman, Director of the Washington Advisory Group and Emeritus Dean and Professor at Georgia Tech, gave the keynote, “Competitiveness, Innovation, and Diversity: A View from Washington.” Dr. Sterling, Chief Scientist, Center for Computation and Technology (Louisiana State University) and Center for Advanced Computing Research (California Institute of Technology) presented a technical talk on supercomputing. The Monday morning session had two panels scheduled. The first panel gave an industry perspective on the challenges and opportunities on strengthening competitiveness with the following speakers: Bill Silva, Federal Higher Performance Computing, Microsoft; and Cecilia Aragon, scientist from Lawrence Berkeley National Lab. The second panel spoke on Hispanic perspective to the same topic with the following speakers: Diana Gomez, President of the Society of Professional Hispanic Engineers; Judit Camacho, President of the Society for the Advancement of Chicanos and Native Americans in Science; and Michele Lezama, Executive Director of the National GEM Consortium. The objectives of the afternoon session follow: identify existing resources immediately available to CAHSI students and faculty, identify existing efforts in which CAHSI should be involved, and identify new opportunities for collaboration and coordination. The Advisory Board met on Tuesday morning. The results from the meeting and recommendations from the Board of Advisors are not available at this time.

**Outreach Activities**

Materials concerning CAHSI have been disseminated through the following venues:

- Dr. Ramirez presented on CAHSI at the 22nd Annual Conference of HACU in Denver, Colorado, October 11-13, 2008. He spoke to a nearly full room of about 30 attendees, including Dr. Fae Korsmo, Senior Advisor on workforce and diversity to NSF Director Bement.

- CAHSI had a booth in the Exhibit Hall of the HACU Annual Conference where the Social Science Network brief reports, the CAHSI Voice article, the CAHSI flyer, and multiple examples of student work and posters from the CAHSI Annual Meeting were distributed. The booth also provided opportunities for one-on-one discussions with HSI and other institutional administrators and faculty as well as with students interested in CAHSI and possible careers in computer science.

- CAHSI materials were disseminated at the TeraGrid ‘08 conference held in May in Las Vegas, Nevada. The TeraGrid annual conference is the annual meeting for the national TeraGrid high-performance computing resource providers and users as well as other interested parties. Some members of CAHSI institutions are users of TeraGrid resources. The resource providers and users are a possible source for research and education collaborators for CAHSI members.

- CAHSI shared a booth with other BPC groups at the SIGCSE 2008 conference in Portland, Oregon.

- CAHSI institutions are individually involved in outreach. NMSU, TAMUCC, UHD, CSUDH, FIU, and UTEP have used the CS0 material to engage middle to high school students in computing. For example, TAMUCC held a Women in Technology Summer camp for young ladies who have just completed their sophomore, junior, or senior year in high school this summer.

**Publications**


Rosas, E. and J. He, Reduction of the false positive detection of α-helices from low resolution protein density maps, research poster presented at the 2008 Computational Structural Bioinformatics Workshop in Philadelphia, PA.

Rosas, E. and J. He, Alpha Helix Prediction Using Helix Tracer, research poster presented at the 2008 NM-AMP Conference in Las Cruces, NM.


Rojas, D., Mehrubeoglu R. (2008, October 10) "Research on 3D biped motion through the use of LEGO Mindstorms NXT", 2008 Hispanic Association of Colleges & Universities (HACU) 22nd Annual Conference, Denver, Colorado


The list of short papers and posters that will be presented at the CAHSI 3rd Annual Meeting follows:

1. Method of Incorporating Data Mining with Snort and Iptables (Johnly Tomelden)
2. Integration of Dipole Model and Current Density Reconstruction towards 3-D Source Localization using EEG and MRI (Gabriel Lizarraga, et al.)
5. Detecting Electrodes Leading to Seizure from Subdural EEG using Spectral Phase Analysis towards Seizure Prediction (Melvin Ayala, et al.)
6. Coherence Analysis of Subdural EEG towards the Delineation of Electrodes that Initiates Epileptic Seizures (Mercedes Cabrerizo, et al.)
7. Illumination Invariant Face Detection with Time-Dependent Intrinsic Images under Near-IR
lighting (Mouncef Lahlou, et al.)

8. Thermal Infrared Imaging for the Detection of Temperature Increase on the Head Surface Due to Motor Activity (Ana M. Guzman, et al.)

9. Resolving Malicious Patterns in Network Traffic using Data Mining Techniques (Joel Ortiz)

10. CSRL See5 Transformation: Using PHP for Data Transformation Between SNORT® IDS Databases and See5 Flat Files (Eric Flior)

11. Using Alice to Quickly Prototype Video Game Mechanics and Ideas (Daniel Jaramillo)

12. Quantization of Multivariate Continuous Random Variables by Sequential Dynamic Programming (Samuel Palmer, et al.)

13. Gaming Mechanics in Alice (Sridurga Shilpa Ganapathineedi)

14. Characterization of local protein structure geometry from the Protein Data Bank - A senior project in bioinformatics (Joseph Santini)

15. A Survey of Underwater Wireless Sensor Networks (Bo Dong)

16. Underwater Robotics (Diego Rojas Bandini and Dugan Um)

17. Web Search Results with a Natural Language Filter (Liem Luong)

18. Creating a Windows or Xbox 360 Video Game Using C# and Microsoft XNA Game Studio (Reuben Rodriguez)

19. Obtaining the Most Reliable Path in a Complex Network of Nodes (Melinda Chin, et al.)

20. Combining Phones, Syllable and Phonological Features in Speech Recognition Using Neural Networks (Arturo Geigel)

21. Tipping Point Evaluation of a Network Intrusion Detection System (NIDS) for Peer-to-Peer Networks (Adam Magana, et al.)

22. A Crash Recovery Mechanism for the NetTraveler Database Middleware System (Osvaldo Ferrero)

23. Runtime Assertion Checking Support for JML on Eclipse Platform (Amritam Sarcar)

24. Gait Analysis Using Optimization and Constraint Programming (Essau Ramirez)


26. Autonomic Ranking of Data Sources and Query Processing Sites using Ant Colony Theory (Eliana Valenzuela-Andrade)

27. A Protocol Offload Framework Applied to a TCP Offload Engine and Web Traffic (Juan M. Solá-Sloan)

28. Detecting Objects in Images Using Asymmetric Haar Features (Geovany A. Ramirez)

29. Prospec 2.0: A Tool for Generating and Validating Formal Specifications (Jesus Nevarez, et al.)

30. Utility Functions for Efficient Geocast Information Sharing (Fernando J. Maymi)

31. Semi-Supervised Clustering of Text Documents Using EM Algorithm with Multinomial Naive Bayes (Roxana Aparicio)

32. Modeling Teeth for Facial Animation (Sarah Spofford)
33. Towards a Fast, Practical Alternative to Joint Inversion of Multiple Datasets: Model Fusion (Omar Ochoa)

34. Formally Specifying and Validating Data Assurance Properties for Real Time Data Processing Applications (Irbis Gallegos)


36. Communicating High-level Programs with FPGA-based Acceleration Hardware (Arnaldo Cruz)

37. The Center for Science, Technology, Ethics, and Policy (Christian Servin)

38. Enhancing Workflow-Driven Ontologies: A Meta Model to Create Conceptual Workflows at Multiple Abstraction Levels (Leonardo Salayandía and Aída Gándara)


40. Probe-It! Visualization Improvements (Hugo D. Porras and Nicholas Del Rio)

41. Scheduling Master-worker Divisible Tasks (Luis de la Torre)

42. An $O(2^{k \log k} n)$ Algorithm for Defensive Alliances (Rosa I. Enciso)

43. Automata Signal Analysis and Convolution Image Algebra for an Entropy-based Change Detection Modeling Framework (Marie Lluberes)

44. Sensor Array Beamforming Algorithms for Bioacoustics Signal Analysis (Abigail Fuentes)

45. Analysis of Environmental Data in Data Centers (Lola Bautista)

46. Gridjobs - A Personal High Throughput Computing Platform (John Sanabria)

47. Instrumentation Support Testbed for Bioacoustics Signal Processing (Hector Santiago)

48. System Level Design Approach to Signal Processing Algorithms (Inerys Otero)

49. Electronic Learning Agent System (Jonathan Keele)

---

**Web/Internet Site**

CAHSI website: [http://cahsi.org](http://cahsi.org)

Direct link to the materials are as follows:

- PLTL resources website at UTEP: [http://robust.cs.utep.edu/PLTL](http://robust.cs.utep.edu/PLTL)
- PLTL resources website at TAMUCC: [http://www.sci.tamucc.edu/~pltl/peerLeaderIndex.html](http://www.sci.tamucc.edu/~pltl/peerLeaderIndex.html)
- CS-0 website at TAMUCC: [http://csci.tamucc.edu/cs-0](http://csci.tamucc.edu/cs-0)
- BPC website on CS/AMP: [http://csamp.tamucc.edu](http://csamp.tamucc.edu)
Other Specific Products

Proceedings of the CAHSI 2nd Annual Meeting and the CAHSI 3rd Annual Meeting have been documented. The proceedings include short papers of posters and descriptions of workshops and student panel sessions. The proceedings are distributed during the meeting and posted on the CAHSI Website (http://www.cahsi.org).

Contributions within the Discipline

CAHSI is developing resources for faculty teaching a CS0 course and PLTL. The Affinity Research Group Handbook serves as a resource for faculty, especially young faculty, who are starting research groups. The evaluation of CAHSI initiatives is contributing to the body of knowledge in the area of recruitment, retention, and advancement of Hispanic students. ARG workshops have been presented to faculty and students from over 10 institutions across the U.S.

CAHSI highlights the research being done at member institutions through the Proceedings of the CAHSI 2nd Annual Meeting and the 3rd Annual Meeting. It includes short papers of the posters presented at the meeting. Aside from being distributed during the meeting, it is posted on the CAHSI Website (http://cahsi.org).

Contributions to Other Disciplines

CAHSI practices are transferrable to other disciplines. In particular, preliminary results indicate that CS0-Python material can be used to assist in the teaching and understanding of mathematical concepts. Simulations using Python can also be used to teach engineering concepts. The Affinity Research Group model has been disseminated successfully to faculty from areas such as psychology, biology, mathematics, liberal arts, and various areas of engineering.

Contributions to Human Resources

This program is developing both students and faculty at CAHSI institutions. Targeted workshops have taken place for faculty to implement CS0, PLTL, and Affinity Research Groups. In addition, workshops at CAHSI institutions are given to develop student peer tutors. Sessions are also held to train and develop faculty mentors at UHD, CSUDH, and other institutions. CAHSI is also developing workshops to train student and faculty advocates. CAHSI has promoted stronger research atmosphere at CAHSI institutions.

Dr. Edgar Ferrier and Dr. Umberto Ortiz graduated from the CISE Ph.D. Program at UPRM.

Dr. Nayda Santiago was awarded the 2008 HENACC Education Award for her contributions to education, in particular her work in advancing undergraduate research.

Dr. John Fernandez was recognized through the MAES 2008 Maestro Award for his contributions to advancing Hispanics through numerous efforts including his work in CAHSI.
Contributions to Resources for Science and Technology

Not applicable

Contributions beyond Science and Engineering

The CAHSI focus on recruitment, retention, and advancement of Hispanics has resulted in improved curricula and development of students' professional and research skills. As a result, CAHSI impacts the capacity of Hispanic students who enter the workforce.

See contributions listed for “Contributions to Other Disciplines.”
APPENDIX: EVALUATION REPORT
Findings

CAHSI Evaluation Progress Report

Prepared by:  ATLAS Assessment & Research Center, University of Colorado-Boulder
Dr. Heather Thiry, Dr. Lecia Barker, and Dr. Sarah Hug

Measuring Progress: Recruiting, Retaining, and Advancing Hispanics in Computing

External evaluation of CAHSI indicates progress has been made in furthering Hispanic students through the computing academic and career pipelines. According to student level data, 55 Computer Science Zero (CS-0) students have enrolled in and completed additional computer science courses since their successful completion of the introductory course. Additionally, Hispanic students in target CAHSI courses selected for the Peer-led Team Learning (PLTL) intervention show significantly higher course completion rates since the inception of the CAHSI interventions. Affinity Research Group participants contributed to high-level computing research over the 2007-2008 academic year—58 ARG participants attended professional conferences, 29 presented a poster professionally, and 16 co-authored a journal article. A number of undergraduates in ARG have continued their graduate studies within the CAHSI institutions.

This progress report describes data collected and analyzed since the April 2008 National Science Foundation BPC site visit. Data were collected from student surveys and interviews, informal interviews with CAHSI stakeholders (principal investigators, staff, faculty, and instructors), and from institutional research offices at CAHSI institutions.

Retaining Hispanic Students in Core Computer Science Courses: Keeping the “Precious Few” Engaged in Computing

Quantitative data indicate that the PLTL interventions are successful in retaining Hispanic students in computer science coursework. Student enrollment and course completion data were collected from CAHSI institutions engaged in PLTL activities. The data indicate that PLTL course takers, especially Hispanic course takers, were more likely to successfully complete computer science courses since the CAHSI alliance began.1

Data were collected from the fall of 2003 through the spring of 2008, and are reported for complete calendar years 2004-2007. Evaluators tracked enrollment in the same course for multiple semesters, and grouped courses and semesters by calendar year, as that is typical in reports from institutional research offices for CAHSI institutions. Over 3,000 student records were analyzed. Students were added to the database if they had ever taken a target course (CS-0 or PLTL courses for computer science majors) in the years before and after CAHSI’s inception. The years preceding CAHSI serve as a comparison.

In computer science courses, students often enrolled in required classes multiple times, eventually completing the course successfully or dropping out of the major entirely after multiple course failures. Course repetition slows student progress in the major, and in some institutions creates a bottleneck for other students. It is also postulated that these false starts and disruptions of schooling lead to frustration, decrease in confidence, and eventually to a students’ change of major. In order to capture total student enrollment and accurate course completion rates, each student enrollment was counted in the denominators for each academic year analyzed. When students are successful in the course, they are counted within the numerator of the course completion rate. For example, if a student enrolled in computer science 101 in the fall of 2004, the spring of 2005, and then successfully completed computer science 101 in the summer of 2006, her transcript would indicate 0/1 in 2004, 0/1 in 2005, and 1/1 in 2006. Denominators do not correspond to individual students, but to individual student enrollments in each CAHSI course. It is possible for an individual student to be represented in multiple years for the same course or for different PLTL courses. Perfect retention in PLTL courses would show a rate of 100%.

1 Data analyzed to date include computer science courses only, and include four of the five relevant CAHSI institutions. Evaluators have not yet received data from one school. Mathematics courses instituting PLTL were analyzed separately.
Student course completion in PLTL courses has increased since CAHSI began in 2006. Students were better able to pass challenging computer science coursework in 2006 and 2007 upon first enrollment, with Hispanic students in computing meeting and even surpassing overall course completion rates in targeted CAHSI courses. These differences were statistically significant in two-tailed z-score tests, at the 0.01 level, meaning that there is 1% chance that the differences detected were due to chance. An argument could be made that for repeat course takers, simply retaking the course in 2006 after an unsuccessful attempt in 2005 would raise achievement, with or without the intervention. In other words, the change in completion rates might have little to do with the intervention, and may only be a factor of experience in a course. To test the possibility that repeat course takers were skewing the course completion data, student completion rates for first time course takers only were also computed and compared across years. In the following figure, students who enrolled in a course only once in their academic careers are compared before CAHSI and after CAHSI. Results suggest that PLTL is increasing the number of Hispanic students who are able to successfully complete computer science courses upon their first enrollment, though it seems to have little effect on repeat course takers. As more data become available, evaluators will examine differences in gender and ethnicity in more detail, as well as examine attrition and retention in the major through school records.

<table>
<thead>
<tr>
<th>*indicate CAHSI implementation years</th>
<th>Calendar year (spring, summer, and fall semesters combined)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2004</td>
</tr>
<tr>
<td>Total number of Hispanic students successfully completing PLTL courses after one enrollment (numerator)</td>
<td>107</td>
</tr>
<tr>
<td>Total number of Hispanic student enrollments for students enrolling only once in PLTL courses (denominator)</td>
<td>140</td>
</tr>
<tr>
<td>Hispanic student course completion rate for PLTL courses for first time course takers</td>
<td>76%</td>
</tr>
<tr>
<td>Hispanic students with multiple enrollments completing PLTL courses</td>
<td>23</td>
</tr>
<tr>
<td>Total number of Hispanic student enrollments for students enrolled multiple times in PLTL courses</td>
<td>63</td>
</tr>
<tr>
<td>Total number of all students successfully completing PLTL courses</td>
<td>228</td>
</tr>
<tr>
<td>Total number of all students enrolled in PLTL courses</td>
<td>372</td>
</tr>
<tr>
<td>All student course completion rate for PLTL courses for first time course takers</td>
<td>61%</td>
</tr>
</tbody>
</table>

Computer Science Zero- Recruiting Students into Computing
Students from five CAHSI partner institutions enroll in an introductory computing course in which they program computers to manipulate sound and visual media. The experience engages students in computing problem solving and introduces students to computing careers. Student records show that 55 students from CS-0 subsequently passed CS-1 courses at the same institution. Thirty-eight of these students are not computer science majors (and therefore were not expected to continue in computer science coursework), and one-half were U.S. Hispanic students. See figure below. The figure above shows that a modest number of students are continuing their computer science study following enrollment in CS-0. It is important to note that few women continued in computer science. This data shows only those students continuing their computer science education at the same institution. CAHSI institutions, like many public universities, experience high transfer rates, which limits the ability to track student outcomes in computing. Further study of student records will show if the students continuing their education in computing are recruited to the major and persist throughout the computer science pipeline.

CS-0 Survey Responses
In the spring of 2008, 112 students completed surveys regarding their experiences in CS-0 courses. The majority of students enrolled in CS-0 were Hispanic (60%) and male (62%), and the average (self-reported) student GPA was 2.97. Upon completing CS-0, 86% (96 students) reported they were more likely to take additional computing courses, 49% (55 students) were more likely to major in computer science, and 50% (56 students) were more likely to study computer science in graduate school.

CS-0 students felt they gained technical skills from the course; they also developed problem-solving abilities in the project-based environment. Partner and group work was key to student accomplishment—according to CS-0 students, working with others enhanced their learning how to program. See figure above.

An important element for success in computing academic programs is confidence—student confidence is a better predictor of retention in the major than GPA (Cohoon, 20XX). CS-0 courses positively impact student confidence in computer science for most students. According to survey results, 70% of respondents (78 students) said that the course affected their confidence in using computers. Open-ended responses indicate that many of those whose confidence was not affected by the course already had high confidence in their computing abilities.

Survey respondents described their increased interest in computing activities. Over half of the
Survey respondents described their increased interest in computing activities. Students found that their professors increased their interest in computing (82% or 92 students). Over half of the CS-0 students described courses in which 89% (100 students) felt they could communicate with their professors, asking questions when they needed to do so. Faculty approachability is often cited as a barrier to science persistence—the fact that CS-0 professors are seen as helpful and encouraging computer science aspiration may be important for CAHSI success.

A significant minority of students (25 to 40) would have preferred more opportunities to manipulate graphics and sound, design and modify computer programs, and would have liked the CS-0 course to have been more relevant to their intended careers. In other words, a large number of students come into CS-0 courses with set expectations for studying in a different field.

These figures suggest matters for discussion. The first concern is that for some students, CS-0 may be recruiting too late, when potential computer scientists have already decided upon an intended career. CAHSI is addressing this issue by provided CS-0 as outreach to prospective college students and to high school students enrolled in a college bridge program. The second issue is that students may not recognize the application of computer science in their chosen areas of interest. CS-0 might introduce interdisciplinary careers that are highly technical while intersecting with other fields (e.g., bioinformatics, artificial intelligence) to show students how they might pursue their passions and computer science simultaneously.
Affinity Research Groups- Apprenticing Computer Science Professionals

Overall, 87 Affinity Research Group (ARG) students completed the survey: 32 students in spring 2008, 34 students in summer 2008, and 21 students from the research course at University of Puerto Rico, Mayaguez. Survey responses were received from UTEP (38% of student participants), TAMU-CC (10%), UHD (2%), CSU-DH (12%), NMSU (8%), and UPRM (27%--all but three of these students participated in the research course).

ARG students were primarily undergraduates, with a few graduate student participants. Undergraduate students tended to be upperclassmen. Only 2% of ARG students were 1st year students, 10% were 2nd year students, 18% were 3rd year students, 25% were fourth year students, and 28% were 5th year undergraduates. In addition, 12% were master's students, and 3% were Ph.D. students.

Many ARG students were relatively inexperienced researchers. Two-thirds of students had only completed 1-2 semesters or summers of research. One-quarter of students had completed 3-4 semesters or summers of research, and the remainder had completed 5 or more semesters or summers of research.

ARG students were predominantly Hispanic (72% of students). The remainder was Caucasian (13%), Asian (7%), or African-American (3%). ARG students were also predominantly male (78% of students). Less than a quarter of ARG students were female. The gender representation of ARG students is consistent with the national average: in 2005, 22% of bachelor’s degrees in computer science were awarded to women (NSF, 2006—women, minorities, and persons with disabilities in science and engineering). Finally, two-thirds of students were computer science majors, while the rest were computer engineering majors.

Understanding the research process
Participation in authentic research tasks and projects helped students to develop a more accurate understanding of the process of scientific research. Students begin to understand that research is a slow process that is rife with setbacks, failure, and ambiguity. ARG students developed a better understanding of the research process through their research work. The overall mean for all of the items on this scale was 3.27 out of 4.0. In fact, almost all students (90%) reported that they gained a better understanding of what everyday research work is like. Most students (88%) also increased their understanding of the process of computer science research. Students’ research work also translated to the classroom. Most students (89%) thought that their knowledge from computer science courses seemed more relevant as a result of their research work.

Career clarification

Although students were less likely to cite clarification of career goals as a “top 3” gain from their research experience, they rated career and educational gains as their top gains on the gains scales. The overall mean for items related to the clarification or confirmation of career goals was 3.44 out of 4.0—the highest mean of any gains scale. Therefore, students strongly believed that research helped to prepare them for graduate school and/or a career and helped their decision-making process about their future goals. Every student (100%) reported that they believed that research had enhanced their résumé. Almost all students (94% for each item) thought they had greater knowledge of education options and felt more prepared for a career in computer science. Faculty advisors and professors were also helpful in providing students with information about graduate school and careers. Almost all students (93%) reported that their faculty advisor (or course professor in the case of UPRM) had provided useful career information. Although students may not have valued gains in career preparation and clarification as much as gains in skills and knowledge, they clearly gained clarity about their career goals and preparation for future educational and career pursuits from their research experience.

Professional dissemination of research results

Most ARG students had the opportunity to participate in professional forums in their field of interest. Two-thirds of students attended a professional conference within the past year. Less often, students had the opportunity to present or publish their results; however, our prior research on UR has shown that these accomplishments are rare for undergraduates (Hunter et al., 2007; Seymour et al., 2004). Nevertheless, one-third of ARG students presented a poster at a conference in the past year, 18% of students authored or co-authored a journal manuscript, and 10% presented a conference paper. ARG students seem to have had ample opportunities to engage in authentic research that led to publishable results.

Collaboration/teamwork

The Affinity Research Group model provides researchers a structure for working together as a team and creating positive interdependence. Students made solid gains in developing collaborative relationships and teamwork skills. Students were asked a series of questions about the collaboration among their research group. The overall mean for the questions on this scale was 3.30 out of 4.0. Students felt that they were an essential part of the research group; 90% of students felt that they contributed to decisions that impacted the direction of the research group. Students also valued their research mentors; 91% of students felt comfortable talking to their mentor about problems. Almost all ARG students (95%) also reported that their research group gave them feedback on their work. ARG students worked collaboratively and collegiality with their research mentors and peers during their research experience.

Top 3 gains from research

Students were asked to pick their top three gains from their research experience. The most frequently selected gain was technical knowledge (69% of students cited this as a top three gain). Two-thirds of students also picked research skills as a top gain. The majority of students also cited intellectual skills, such as critical thinking and problem solving (55%), personal growth, such as confidence (54%), and teamwork skills (53%). Fewer students cited communication skills (44%) or clarification of career
goals (29%) as their top three gains from research. Students’ top three gains are outlined in the figure below.

In sum, students made a variety of gains from their research experience, including growth in confidence, increased interest in computer science, clarification of their career and educational goals, and increases in communication, technical, and intellectual skills. Students also learned to work collaboratively within their research group and gained skill in democratically resolving disagreements among group members. Many students also had the opportunity to attend professional conferences and a significant minority was able to disseminate their research results through conference papers or peer-reviewed journal articles.

**CAHSI Student Impressions of PLTL Practices**

In the spring of 2008, 158 students from CAHSI institutions responded to the spring 2008 PLTL survey. Two thirds (103) of the students indicated they were Hispanic/Latino/a, while one quarter stated they were Caucasian (40). Forty-four students were female, and 28 of the women were Latinas. The overall average self-reported GPA was 3.07.

Students were asked about their impressions of PLTL courses, particularly about their relationships with PLTL leaders and the activities the leaders conducted. Respondents also described how the course impacted their decision to take more computing courses. See figures below, in which students who agree or strongly agree with the statements at left are depicted in the bar graph.

Over 80% of students surveyed stated that PLTL sessions prepared them for course tests, and 85% felt that activities conducted by their undergraduate peers helped them understand course material. Over four-fifths of students also felt that PLTL strengthened their problem solving skills. Open-ended responses provide more depth and explanation of these data.

"The peer leader helped me understand, he spoke more of my language. Coming into computer science I had no idea what the professor was talking about, let alone what the TA was talking about, but with the peer leader he was on our level. I loved it when it was our time to be with the peer leader."

Hispanic female engineering student

"I found that there are other ways to look at computer problems rather then just numbers. I can see a more visual way of grasping the lessons."

![Benefits of PLTL activities (n=157)](image-url)
These quotes indicate that undergraduate peer leaders were able to explain computer science to students differently than the professors and TAs, and that approaching the subject matter from a different angle was beneficial for some students.

**Developing a community of novice computer scientists**

In some instances, PLTL provided a venue for tiered mentoring, in which leaders could impart not only course knowledge, but also academic program knowledge to students (e.g. which courses to take). PLTL sessions also were used for socializing—the relaxed atmosphere reportedly allowed students to get to know one another better. In fact, 90 students said that they study with people from their PLTL group outside of class time.

“*PLTL sessions helped me to socialize with a lot of people that are at the same academic level as I am, so I feel confident that in harder courses to come I can get help from a lot of sources out side the class.*”

Hispanic male computer science student

“*Well, I have to take more courses to achieve a degree in Computer Science, but I feel more comfortable in taking the higher-division courses, because my peer leader explained to me what the upper-division courses would cover.*”

Hispanic male computer science student

Developing student confidence in their computing abilities was described as an important goal of PLTL by CAHSI stakeholders. For most students, PLTL sessions were successful in increasing confidence. See figure below, in which students’ agreement with the statements at left are depicted in the bar graph.

Some students described the ways in which PLTL leaders and activities increased their confidence in computing.

“If I am successful in this class, I feel I could be successful in other CS courses.”

Hispanic male student (major not indicated)

“Even though I am not doing well, I still want to try hard and succeed in computer science. Having a peer leader shows me that not everyone does well the first time, but when you finally get it, everything is that much better.”
Whit female computer science student

**Negative experiences in PLTL classrooms**

Despite the assistance given in PLTL courses, students are still experiencing difficulty in computer science courses, and find that computer science is not what they want to study. In a survey item, students were asked if the course affected their decision to take more computing courses. Five students indicated that the computer science 1 course made them realize they did NOT want to further their education in computing. Two of the students were white males, one an Asian female, one Hispanic male and one Hispanic female.

**"I will never take a Computer Science course again."**

White male computer science student

**"Well, the course helped me to know that computer science is not for me, and after this I decided to change my major."**

Hispanic female computer science student

As in past surveys, a significant minority of students were not pleased with the PLTL sessions. Sixteen students consistently responded negatively to the items about confidence, utility of activities, and attitude toward peer leading. Two of these students responded negatively on the forced choice but positively in all of the open-ended items, leading evaluators to believe they may have miss-marked the items.

Those who were unhappy with the PLTL sessions were mostly Hispanic, split evenly between female and male students. They differed from the other students in GPA—the less content students had a 3.33 average while the other students averaged 3.04. Students with less positive opinions of PLTL had taken more computing courses than the remainder of students as well- they averaged 4 courses while the average for the remaining students was 3.37 courses. Again, students mentioned a desire to get their lab reports done during PLTL session activities. Only one mentioned poor planning and preparation by a PLTL leader as a reason for not benefiting from PLTL. As PLTL becomes a more established practice in CAHSI schools, students who have thrived in the traditional courses will be more accustomed to the new course format, and may find value in the PLTL sessions.

**The value of PLTL for students**

PLTL sessions appear to be effective in increasing student confidence in and understanding of computer science. The practice provides a venue for tiered mentoring of undergraduate students by their near-peers, students a few years ahead of them in their studies. Student course completion has increased since the inception of the CAHSI Alliance. Further analysis of PLTL results as well as course taking patterns in CAHSI institutions will be presented in the February 2009 evaluation report, and will include fall of 2008 results.

**Peer Leaders—Mentoring Undergraduates Through the Computing Pipeline**

Seventeen students completed the peer leader survey, representing three schools: UTEP, TAMU-CC, and CSU-DH. Most students had minimal experience as peer leaders: 63% had served for 2 semesters and 37% had served for one semester. Students were diverse racially and ethnically: 40% were Hispanic, 47% were Caucasian, and 13% were Asian. Peer leaders were not diverse as far as gender, 82% of peer leaders were male. Peer leaders also tended to be upperclassmen: 44% were seniors, 38% were juniors, 13% were sophomores, and 6% were freshmen.

**Skills**

Peer leaders made considerable gains in communication, teaching, and interpersonal skills, and lesser gains in study and decision-making skills. All peer leaders agreed or strongly agreed that being a peer leader had improved their oral communication and teaching skills, while 94% felt that peer leading had enhanced their interpersonal skills. Three-quarters of peer leaders thought that their leadership skills had improved. However, peer leaders noted slightly weaker gains in study skills and decision-
making skills. Half of peer leaders reported that their study skills had improved, while two-thirds noted improvement in their decision-making skills.

**Aspirations**

Peer leaders became more interested in a computing career as a result of their experience as a peer leader. In fact, 75% of peer leaders reported that their role as a peer leader had increased their interest in a computing career. However, only 25% of students reported that peer leading had influenced their thoughts about graduate school. Most peer leaders commented that they were already planning to attend graduate school before their peer leading experience or that research had more influence in their decision to apply to graduate school. Likewise, 38% of peer leaders reported that peer leading had influenced their thoughts about becoming a professor. Peer leaders who became more interested in being a professor often cited teaching and helping students as their motivation. Through peer leading, these students discovered that they liked teaching and enjoyed working with students. As there are so few PLTL leaders, quotes are not attributed in an effort to protect anonymity.

"Being a Peer Leader has helped me see how I can effectively teach and help students and this has influenced me a bit."

"Now I would like to be. I've learned a lot, and I realized I like teaching!"

**Beliefs about PLTL and its effectiveness**

Peer leaders strongly believed in the effectiveness of PLTL in helping students to learn computing concepts. Indeed, 94% of peer leaders believed that PLTL is an effective way to teach students with little background in computing. In an open-ended question, peer leaders described their role as a facilitator, helper, or guide, rather than a traditional teacher. Peer leaders also emphasized that they encouraged students to work together and learn from one another.

"Facilitate discussion in my sessions to promote a group approach to learning activities."

"Helper, guide to help students to understand the concepts better."

**Knowledge of computing concepts**

Peer leaders were also confident in their understanding of key computing concepts. All peer leaders reported that they understand computing concepts well enough to be an effective peer leader. In addition, all peer leaders believed that they are typically able to answer students’ computing questions. Peer leading also reported that leading PLTL increased their computing knowledge (81% agreed or strongly agreed with this statement).

**Peer leading benefits**

Peer leaders clearly benefited from their role in facilitating PLTL sessions. Peer leaders made considerable gains in communication, teaching, and interpersonal skills, and lesser gains in study and decision-making skills. Peer leaders also expressed confidence in their ability to communicate effectively, help students understand concepts, and motivate students, although they expressed less confidence that their effort and hard work may lead to changes in students’ learning. Peer leaders found practice activities and social interaction to be the most helpful aspects of their training, although they expressed a need for more guidance in creating PLTL activities and working with unmotivated students. Finally, being a peer leader influenced students’ career aspirations. Students became more interested in a computing career as a result of their peer leading experience, yet being a peer leader had less influence on their aspirations to attend graduate school or become a professor.