CAHSI EVALUATION REPORT
2013-2014

Table of Contents
Executive Summary ........................................................................................................................................4
Section 1. Q4. Significant Results ........................................................................................................4
Section 1. Q5. Key Outcomes or Other Achievements ........................................................................4
Section 1. Q7. How have the results been disseminated? ....................................................................5
Section 4. Q2. What is the impact on other disciplines? .......................................................................5
Section 4. Q3. What is the impact on the development of human resources? .....................................6
Section 4. Q5. What is the impact on institutional resources that form infrastructure? ..............6
Recommendations ......................................................................................................................................7
Developing leaders ..................................................................................................................................7
Intentional growth ..................................................................................................................................7
Strategic planning for continued innovation for Hispanics in computing ............................................7
Communicating among members .........................................................................................................8
Sustaining the CAHSI annual meeting ..................................................................................................8
Dividing leadership tasks and responsibilities ......................................................................................8
Introduction .............................................................................................................................................10
Common Core Indicator #1: Individual Outcomes .............................................................................10
Profile of CAHSI students .....................................................................................................................10
Student participation in CAHSI initiatives .............................................................................................11
CAHSI, original schools ..........................................................................................................................12
CAHSI Degree Completion Rates ..........................................................................................................13
Bachelor’s degrees .................................................................................................................................13
MS degrees ............................................................................................................................................16
PhD degrees ............................................................................................................................................17
CAHSI Student Advancement ................................................................................................................17
Future Aspirations ........................................................................................................ 17
Professional Behaviors ................................................................................................. 19
Scholarship and Fellowship Applications ....................................................................... 20
Growth in Students’ Knowledge and Skills .................................................................... 20
Belonging and Climate .................................................................................................. 22
Networking and Support ............................................................................................... 24
A case study of student support: CAHSI peer leaders .................................................... 26
Conference benefits ...................................................................................................... 26
Building supportive community for student retention and advancement ....................... 26
Innovating in PLTL- changing the format, keeping the ethos of peer leading ................. 26
Learning by Leading ...................................................................................................... 28
Common Core Indicator #2: CAHSI Organizational Capacity ........................................ 29
CAHSI Network Assessment of Collaboration ............................................................... 29
Visualizing the CAHSI network ..................................................................................... 29
Measures of Trust and Reliability across Alliance Partners ........................................... 33
Measures of Value to the Organization across Alliance Partners .................................. 33
CAHSI’s Outcomes and Potential Outcomes .................................................................. 33
Level of Success Achieved, Secrets to Success .............................................................. 34
CAHSI Organizational Capacity rubric .......................................................................... 36
Healthy pipeline: ............................................................................................................ 40
Faculty/staff engagement and training ........................................................................... 40
Funding Sustainability .................................................................................................... 41
Common Core Indicator #3: CAHSI Alliance Impact ....................................................... 41
CAHSI social network survey ......................................................................................... 41
CAHSI Network Partner Contributions ......................................................................... 42
Assessment of CAHSI as a partner ............................................................................... 43
Nearly all partners perceive CAHSI as “very” to “completely” successful, powerful ..... 44
CAHSI’s strengths ......................................................................................................... 44
Future collaborations ...................................................................................................... 44
CAHSI Alliance Impact Rubric ...................................................................................... 45
Appendix: Data Collection Methods and Survey Samples .............................................. 52
Affinity Research Group Survey .................................................................................... 52
CAHSI/SACNAS Annual Meeting Survey ................................................................. 52
Peer Leader Survey ......................................................................................... 54
CRA Data Buddies Survey ............................................................................... 54
Executive Summary

The executive summary is framed within the structure of the National Science Foundation RPR document.

Section 1. Q4. Significant Results

CAHSI is extending its national reach as seen in the Alliance Impact indicators in national and regional leadership, including extending its influence through policy activity, and continuing its efforts to collaborate across institutions via new programming and research. Leadership and support of CAHSI in higher education and STEM education organizations is spreading across CAHSI principal investigators. Nine CAHSI faculty members from seven institutions serve as CAHSI delegates to national and regional organizations interested in improving and diversifying the computing workforce. These organizations include SACNAS, Computer Science Principles, M-SETUP, Caribbean Celebration of Women in Computing, Microsoft, Excelencia in Education, and the PLTL International Society. Nearly all schools developed a research or program proposal that leveraged CAHSI, for a total of 15 proposals across institutions. Institutions continue to support a healthy computing pipeline through K12 outreach (100% of CAHSI institutions) and educational innovation practices (75% of CAHSI institutions).

The CAHSI PI has engaged in public acts that influence policy in three documented instances over the past year [serving on the Excelencia board, writing a position paper with SACNAS leadership, presenting to the Committee on Equal Opportunities in Science and Engineering (CEOSE), a congressionally mandated advisory committee to the National Science Foundation]. These public acts are valuable in that they increase CAHSI's national visibility, show its success as an Alliance, and present CAHSI as a united voice for Hispanics in computing.

Section 1. Q5. Key Outcomes or Other Achievements

CAHSI has provided deep and broad support to students at all educational stages. In the 2013-14 academic year, the original seven CAHSI departments provided:

- 24,840 hours of introductory computing content to 552 students, nearly 2/3 were Hispanic or other underrepresented minority students.
- 18,195 hours of undergraduate-led supplemental instruction through PLTL to 1,213 students, more than 2/3 were Hispanic or other underrepresented minority students.
- 10,305 hours of coursework using the Affinity Research Group model to 229 students; 80% were Hispanic or other underrepresented minority students.
- 7,800 hours of out-of-class research experiences provided to 27 students; 71% were Hispanic or other underrepresented minority students.

CAHSI supported students in achieving their graduate school goals. Thirteen students reported that they applied for fellowships, scholarships, or internships. These students applied for REUs, IEEE scholarships, the STEM Advantage Scholars program, the Department of Energy (DOE) summer fellowship, Grace Hopper fellowship, and the National Reserch Council (NRC)
summer fellowship. Through the support of the fellow-net program, two Latinas earned National Science Foundation Graduate Research Fellowships. Students received guidance from CAHSI faculty, who reviewed their applications and advised them regarding their proposed research aims.

In the past year, CAHSI has continued to produce large numbers of Hispanic baccalaureates in computing. In 2013, CAHSI increased its total number of baccalaureates by 13 students, to 258 graduates from CAHSI departments. CAHSI has also increased its graduation rate of women with bachelor's degrees from 41 to 51 female degree recipients. The number of Hispanic BS graduates from CAHSI departments has remained steady in the past year at 165 graduates. In 2013, there were 2,139 Hispanic BS graduates in CS, CS and CIS in the US, 165 of those students were from CAHSI departments. Thus, CAHSI graduated 7% of the CS/CE/CIS Hispanic baccalaureates in the nation. When only CS and CE are considered, CAHSI mainland schools graduated 17% of the CS/CE Hispanic baccalaureates in the mainland US in 2013.

A study of CAHSI’s social network partners was conducted to investigate whether CAHSI has become recognized by policy, industry, and other leaders as a national organization that affects decision-making and cultural change at the local, regional, and national levels. Professionals in the non-profit, industry, broadening participation, and computing fields were asked in a survey about their impressions of the CAHSI organization, including their perceptions of strengths of the organization as a whole. Data from respondents indicate partners find CAHSI to be a reliable partner (3.75 out of 4), consider CAHSI powerful (4.25 out of 5) and indicate CAHSI is very successful at its mission (4.25 out of 5). Five of the responses (55%) indicated that a student-centered approach, including a strong mentoring model for students, outreach activities, specific messaging and targeted directives that help students achieve in computing are vital to CAHSI’s success. Organizational strengths described include strong leadership, broad impact across like institutions, a clear and compelling mission, and a learning organization orientation (e.g., learns from evaluation).

Section 1. Q7. How have the results been disseminated?

Nine citations were found and/or reported. Works were found in local, regional, and national conferences, book chapters, and journals.

Section 4. Q2. What is the impact on other disciplines?

CAHSI is increasing its visibility and ability to promote change across disciplines at the institutional level—four institutions have evidence of actions taken by administrative leadership (e.g., University presidents and academic deans) that demonstrate that CAHSI aligns with greater educational efforts. At these schools, institutional leaders are engaging CAHSI PIs and faculty in formal dialog about leveraging their work in other departments, are partnering with CAHSI to seek funding to support the spread of CAHSI within STEM, and are bringing CAHSI faculty and practices into larger projects that serve the institution as a whole. One example is the involvement of CAHSI leaders in NSF CREST grants at two institutions that infuse CAHSI practices in multiple disciplines.
CAHSI has successfully disseminated some of its best practices to other disciplines. For instance, Northeastern Illinois University has recently received funding to incorporate the Affinity Research Group and Peer-Led Team Learning models into basic introductory STEM courses, including Physical Geology, General Chemistry, and Physics. Additionally, the CREST-funded Cyber-ShARE center at the University of Texas, El Paso has adopted the ARG model in many of its research groups, spanning a range of STEM disciplines, including Computer Science, Engineering, Biological Sciences, Geological Science, Information Technology, and Geophysics.

Section 4. Q3. What is the impact on the development of human resources?

CAHSI students involved in Affinity Research Groups (ARGs) continue to outpace their national peers in NSF research experiences for undergraduates (REUS) in rates of academic presentation and publication. Almost all of the ARG students (95%) reported that they attended a professional conference, while only 23% of the national sample of REU students had done so. ARG students published in refereed journals at rates higher than the national REU sample: 15% of ARG students and only 5% of the national sample authored papers. ARG students also presented conference papers or posters at substantially higher rates than the typical REU student. All of these differences were statistically significant (Fisher’s exact test, p=.00001). In addition, 75% of ARG students reported that their research experience increased the likelihood that they would pursue graduate school. CAHSI students also had higher aspirations than a national sample of computing students surveyed by the Computing Research Association. For example, 19% of CAHSI students aspired to a doctoral degree, while only 12% of the national sample of students expressed that goal. CAHSI students also felt a greater sense of belonging in computing than other CRA survey respondents (mean of 4.2 out of 5 for CAHSI students, and a mean of 3.99 for CRA survey sample).

Students are gaining the skills, knowledge, and confidence from CAHSI activities, such as PLTL and ARGs, which they will need in graduate school and the computing workforce. Students’ highest gains from ARGs were in intellectual growth. Students’ scores in intellectual gains suggest that they gained critical thinking and problem-solving skills as well as a deeper understanding of the research process (mean of 3.54 out of 4-0 on the intellectual gains scale).

Section 4. Q5. What is the impact on institutional resources that form infrastructure?

CAHSI PIs are gaining visibility for CAHSI practices at their institutions and demonstrating how the practices align with institutional goals and initiatives—half of the institutions have documented engagement with institutional leaders that show the potential for CAHSI to become more established within the institutional infrastructure (e.g., PLTL institutionalization).

CAHSI continues to promote sustainability through human resource development in two ways, through faculty and staff member training and continued participation in CAHSI initiatives. The majority of CAHSI departments engage at least 25% of undergraduate faculty in CAHSI in some way. In the past year, infrastructure that supports CAHSI implementation has been advanced through professional development—half of the member schools hosted trainings last year, and more than half led trainings over the past year. Continuous training supports sustainability and ensures that local infrastructure exists to continue implementing CAHSI practices.
Recommendations

Developing leaders

The case study of peer leading within the international context of the Peer Led Team Learning International Society has many implications for CAHSI’s future. Peer leading provides an ideal platform for student leadership that could promote a stronger CAHSI-wide student community, lessen the burden of curricular lesson development and dissemination on CAHSI faculty, and provide low risk, high reward avenues for experimenting with new curricular innovations. For example, CAHSI students could meet across departments and schools to discuss their lessons, and provide additional PLTL resources for the website and for further dissemination in venues like PLTLIS. UHD’s online PLTL innovation could be replicated across CAHSI in a way that provides student-to-student mentorship for leaders making the change to support students beyond the classroom. Resources already developed at each institution could be shared internally as well as externally to better promote peer leading in computing at the national level. Peer leaders are “on-the-ground” implementers of CAHSI practice, and could take on greater roles in CAHSI’s move towards sustainability, innovation, and alliance impact. Building relationships across CAHSI schools and providing the in-person and online mechanisms that promote collaboration could increase CAHSI’s impact while supporting student growth.

Intentional growth

CAHSI has disseminated its practices widely, yet growth in Alliance membership has remained tightly controlled. Internal network data indicate that the value others attributed to each partner was to an extent related to perceived participation (attendance at meetings and events) as well as time in the alliance. As members are added it is important to communicate the value, role, and position of each member to the alliance. In order to make room for growth that is sustainable, inclusive, and transparent to all joining institutions and current members, an induction process might be useful. The induction process could include the following: a) the new institution showcases its activities and how they relate to CAHSI goals, values, and research-based practices so that all CAHSI members become aware of the institution’s place among them, and b) the CAHSI alliance leadership provides a specific role to the new institution with action items that support CAHSI as an alliance (e.g., leading the charge to find funding for FemProf/Mentor-Grad). In this way, new members can show their value to long term CAHSI membership, and also share responsibility for furthering the organization’s core purpose.

Strategic planning for continued innovation for Hispanics in computing

In recent years, the opportunities for mentoring and supporting faculty have dwindled. With the switch to the SACNAS meeting, the number of supported faculty has declined as scholarship dollars are primarily funding students. While CAHSI leadership at each
institution attend CAHSI-sponsored events, the faculty, instructors, and students with administrative or educative roles in implementing CAHSI have had fewer opportunities to contribute directly to the Alliance. As CAHSI increasingly must find ways to fund local and national CAHSI activities, enlisting faculty and staff with supporting roles in the organization to help may be vital to successful fund raising. Finding ways to do so in a manner that honors their time, builds their careers, and leverages local innovation suggests a few options: a) a faculty development strand at the next meeting for graduate students and early career faculty (either of Hispanic origin or teaching in HSIs) with a focus on grant proposal writing and “selling ideas”; b) connecting faculty across CAHSI institutions for collaborative grant writing through intensive workshops led by CAHSI PIs in conjunction with CAHSI meetings (e.g., SACNAS); and c) small travel seed funds to promote campus site visits for faculty interested in technical or educational collaborations that would contribute funding for CAHSI initiatives. While all opportunities suggested would require modest investment, all would have the potential to support CAHSI in the long term.

Communicating among members
In the past, CAHSI has benefited from regular communication among members, including all-hands meetings and conference calls. This regular communication has facilitated the sharing of best practices, generated ideas for educational innovations, and strengthened the unity of the alliance. As CAHSI has matured and become more established in its practices, these meetings have become less frequent. With the addition of new members and the transition in leadership at several existing institutions, this may be an opportune time to reinstate regular communication channels to promote group cohesion and collaboration.

Sustaining the CAHSI annual meeting
There have been benefits and costs to CAHSI to co-locating its conference with SACNAS. While the benefit of sustainability is clear, one of the hidden costs has been the loss of group identity and opportunities for student and faculty networking. For instance, 35% of CAHSI students were not able to find a mentor at the SACNAS conference, while another 18% were “somewhat” able to find a mentor. Students were able to locate mentors more easily at the former annual meeting. If CAHSI chooses to remain with SACNAS, it should consider creating more opportunities for networking before the conference, so that students and faculty can benefit from a more “CAHSI-focused” experience. CAHSI may also weigh the value of reinstating their annual meeting which offered a stronger sense of group identity and more networking benefits to students and faculty, but this may be difficult to sustain without BPC-A funding.

Dividing leadership tasks and responsibilities
As CAHSI looks to its future and plans for sustainability beyond BPC-A funding, CAHSI might consider conducting a review of their distributed leadership model. While CAHSI’s
organizational structure has traditionally included the executive council and several working groups, these groups have not been as active in the past year with the transition in leadership at several of the institutions and the integration of new members. With new members and leaders on board, this may be an important time to re-examine its organizational structure and division of leadership to ensure that specific leadership tasks and responsibilities are delegated to new and existing members. The new members of the executive council could take on a stronger role in providing oversight and coordinating leadership responsibilities among all members.
Introduction

This report is divided into sections that align with the common core indicators used by the external evaluation of the NSF BPC-A program. The common core indicators measure the progress of the alliance in promoting positive individual student outcomes, organizational capacity to advance its mission, and broader impacts in disseminating its practices and mission to a wider audience.

Common Core Indicator #1: Individual Outcomes

In the 2013-14 academic year, CAHSI provided intensive, deep learning experiences for students through its signature educational initiatives, including CS-0, PLTL, ARG, and Mentor-Grad. The majority of students served by these initiatives were Hispanic, and, for the most part, the proportion of female participants was higher than the national representation of women in CS undergraduate programs. ARGs increased students’ interest in graduate school and helped them to feel more knowledgeable and prepared for graduate school and computing careers. Finally, BS graduation rates in CAHSI departments have increased slightly, and the proportion of Hispanic degree recipients has remained relatively stable.

Profile of CAHSI students

In fall 2013, the Computing Research Association administered the Data Buddies survey to a national sample of computing departments. CAHSI and SACI departments participated in this survey. All students in the department were invited to complete the survey. In all, 51 graduate students and 225 undergraduate students completed the survey. Collectively, these respondents provide a profile of typical students in CAHSI departments.

Undergraduate Respondents:

17% of CAHSI undergraduates began their education at a community college
23% of CAHSI undergraduates report that they have experienced economic hardship that led to a leave of absence from their degree program
50% of CAHSI undergraduates work outside of their studies
53% of CAHSI undergraduates are first-generation college students
64% of CAHSI undergraduates plan to obtain an advanced degree (e.g., MS, PhD, or professional degree)
CAHSI EVALUATION REPORT

Objects 1 and 2: CAHSI Undergraduate and Graduate Student CRA Data Buddies Respondents

Student participation in CAHSI initiatives
CAHSI continued to provide substantial support to students throughout their degree programs. For example, in the 2013-14 academic year, the original seven CAHSI schools provided:

1. 24,840 hours of introductory computing content to 552 students, nearly 2/3 were Hispanic or other underrepresented minority students.
2. 18,195 hours of undergraduate-led supplemental instruction through PLTL to 1,213 students, more than 2/3 were Hispanic or other underrepresented minorities.
3. 10,305 hours of coursework using the Affinity Research Group model provided to 229 students; 80% were Hispanic or other underrepresented minorities.

CAHSI's representation of women in the participation matrix below (object 3) outpaces the national average of women undergraduates in computer science. Nearly one-quarter of the participants in CAHSI initiatives were women. Female participation in PLTL and ARG matched the national average of 18%. Female participation in CS-0 far exceeded the national average. CAHSI's representation of Hispanics (ranging from 55% to 79%) also far outpaced the national average of 10% found in US CS/CS/CIS departments.

Graduate Student Respondents:
- 20% of CAHSI graduate students are balancing their studies with parenting responsibilities
- 26% of CAHSI graduate students were first-generation college students
- 24% of CAHSI graduate students considered leaving their program because of financial constraints
- 63% of CAHSI graduate students are interested in an academic career at a PhD institution
- 77% of CAHSI graduate students are interested in an industry research career
- 96% of CAHSI graduate students want to use their degree to help society

1 Assuming a 15 week semester and a 3 hour course session per week
2 Assuming a 15 week semester and a 1 hour supplemental PLTL session per week
CAHSI, original departments

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Total Students</th>
<th>Total Women</th>
<th>Proportion Female</th>
<th>Total Hispanic</th>
<th>Proportion Hispanic</th>
<th>Total Other Underrep. Minorities (URM)</th>
<th>Proportion URM</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS-0</td>
<td>552</td>
<td>190</td>
<td>34%</td>
<td>306</td>
<td>55%</td>
<td>42</td>
<td>8%</td>
</tr>
<tr>
<td>PLTL</td>
<td>1213</td>
<td>226</td>
<td>19%</td>
<td>667</td>
<td>55%</td>
<td>163</td>
<td>13%</td>
</tr>
<tr>
<td>ARG</td>
<td>229</td>
<td>41</td>
<td>18%</td>
<td>182</td>
<td>79%</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>1994</td>
<td>457</td>
<td>23%</td>
<td>1155</td>
<td>58%</td>
<td>207</td>
<td>10%</td>
</tr>
</tbody>
</table>

**Object 3: CAHSI Original Schools Participation Matrix**

The expanded network of CAHSI institutions (including SACI institutions and Northeastern Illinois University) have also delivered CS education programming during the undergraduate experience. None of the expanded network delivered an introductory CS-0 course; however, institutions in the expanded network provided PLTL and ARG courses. The expanded network of CAHSI schools provided:

- 31,140 hours of undergraduate-led supplemental instruction through PLTL to 692 students, nearly 50% were Hispanic or other underrepresented minorities.
- 1,170 hours of coursework using the Affinity Research Group model provided to 26 students, nearly 20% were Hispanic or other underrepresented minorities.

The expanded network of CAHSI schools also demonstrates rates of female participation that match the national average and rates of Hispanic participation that exceed the national average. Nevertheless, the representation of Hispanics in initiatives at CAHSI expanded schools is somewhat less than the representation of Hispanics in initiatives at CAHSI original schools (31% vs. 58%). Object 4 details the participation of women, Hispanics and other underrepresented minorities in core initiatives at CAHSI expanded institutions.
CAHSI, expanded departments

<table>
<thead>
<tr>
<th>Initiative</th>
<th>Total Students</th>
<th>Total Women</th>
<th>Proportion Female</th>
<th>Total Hispanic</th>
<th>Proportion Hispanic</th>
<th>Total Other Underrep. Minorities (URM)</th>
<th>Total Other URM</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLTL</td>
<td>692</td>
<td>126</td>
<td>18%</td>
<td>225</td>
<td>33%</td>
<td>84</td>
<td>12%</td>
</tr>
<tr>
<td>ARG</td>
<td>26</td>
<td>10</td>
<td>38%</td>
<td>1</td>
<td>4%</td>
<td>3</td>
<td>12%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>718</td>
<td>136</td>
<td>19%</td>
<td>226</td>
<td>31%</td>
<td>87</td>
<td>12%</td>
</tr>
</tbody>
</table>

Object 4: Expanded CAHSI Schools Participation Matrix

CAHSI Degree Completion Rates

Bachelor’s degrees

In the past year, CAHSI has continued to produce large numbers of Hispanic baccalaureates in computing. In 2013, CAHSI increased its total number of baccalaureates by 13 students, to 258 graduates from CAHSI departments. CAHSI has also increased its graduation of women with bachelor’s degrees from 41 to 51 female degree recipients. The number of Hispanic BS graduates from CAHSI departments has remained steady in the past year at 165 students.

![Number of BS graduates, CS & CE, Original CAHSI schools, 2002-13](image)
Since its inception in 2006, CAHSI’s graduation rates have consistently surpassed the national decline in computing BS degree graduates. CAHSI is still outperforming the nation in BS degree production as measured against 2002 graduation rates, nearly the height of BS graduation in computing departments in the United States. Nationally, the comparison set of departments graduated 55% of the number that they graduated in 2002, while CAHSI graduated 68% of its 2002 total.

Object 6: Longitudinal Comparison of Percent of BS Graduates (2002 reference year)

CAHSI graduation rates of Hispanics took a sharp fall in 2009, perhaps due to the economic recession, and have trended upward ever since. Last year, 64% of all BS graduates in CAHSI departments were Hispanic. Nationally, the Hispanic graduation rate in CS/CE/CIS has risen as well. In 2013, 10% of BS computing degrees in those fields were awarded to Hispanics.
While CAHSI has consistently graduated more Hispanic baccalaureates in computing than the nation, it is possible that this could be attributed to their status as Hispanic-Serving Institutions, which enroll at least 25% Hispanic students. CAHSI has higher enrollments of Hispanics at each of its institutions than the national average enrollment of Hispanic students. Thus, we compared CAHSI's graduation rate of Hispanics to the overall graduation rate of Hispanics from CAHSI institutions to determine whether CAHSI departments have achieved parity with institutional averages. The figure below demonstrates that before the inception of CAHSI in 2006, CAHSI departments consistently graduated fewer Hispanics than their institutions overall. However, the graduation rate of Hispanics in CAHSI departments has trended upward, and in 2012, CAHSI's Hispanic graduation rate surpassed the institutional average.
Object 8: Percent Hispanic Computing Graduates Compared to Institutional Graduation Rates

CAHSI has consistently graduated a high proportion of Hispanic MS degree recipients. In 2013, 26% of CAHSI MS graduates were Hispanic (US mainland schools only). CAHSI has traditionally graduated high numbers of women master’s degree recipients, although the number of women receiving MS degrees in CAHSI departments fell from 35 in 2012 to 13 in 2013. Nevertheless, CAHSI continued to produce high numbers of Hispanic MS recipients. For instance, in 2013, CAHSI graduated 27 of the 316 Hispanic MS graduates in CS/CE/CIS in the mainland US. Thus, CAHSI graduated 9% of all the Hispanic MS degree recipients in the mainland US in 2013.
**Object 9: CAHSI MS Degrees Earned, 2002-2013**

**PhD degrees**

Hispanics remain severely underrepresented in computing doctorates. However, CAHSI has contributed to the number of Hispanic computing PhDs in the US. In 2013, 14 doctorates were awarded in CS to Hispanics, and CAHSI produced 3 of those graduates. In other words, CAHSI produced 25% of the nation’s Hispanic doctorates in CS in 2013 (US mainland schools only), although this is a statement of the dire underrepresentation of Hispanic US citizens at the doctoral level.

**CAHSI Student Advancement**

**Future Aspirations**

CAHSI students generally have higher aspirations than the students from CRA’s national Data Buddies survey sample. For example, CAHSI students have slightly stronger intentions to pursue a graduate degree. It is important to note that the total in the object below do not equal 100% because a small proportion of students expressed interest in a professional degree (e.g., J.D., M.D., etc.) or marked that they were “uncertain” about their future plans. Nevertheless, CAHSI students expressed greater interest in graduate study, especially a doctorate degree, than the national sample of computing students surveyed by CRA.
Object 10: Comparison Data Regarding Future Aspirations

The CAHSI symposium at SACNAS and participation in ARGs also influenced students’ career aspirations. For instance, 75% of ARG students reported that they are more likely to attend graduate school because of their research experience. Additionally, the vast majority of students who attended the CAHSI symposium noted that the symposium and other events at SACNAS had increased their interest in graduate school and their commitment to their field of study. In fact, 88% of students reported that the annual meeting had increased their commitment to their field of study either “a good deal” or “a great deal.” Additionally, 94% of students positively marked that CAHSI events had increased their interest in graduate school. Students also overwhelmingly reported that CAHSI events at SACNAS had increased their interest in research, their knowledge of computing, and their knowledge of career options.

**Student outcomes from CAHSI events at SACNAS**

(n=13)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>A good deal</th>
<th>A great deal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased my interest in graduate school</td>
<td>6% 24% 29%</td>
<td>41%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased my knowledge of career options</td>
<td>18% 35% 47%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased my knowledge of computing</td>
<td>24% 53% 24%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased my dedication to my field of study</td>
<td>12% 47% 41%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased my interest in research</td>
<td>24% 35% 41%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Object 11: SACNAS Student Outcomes

Professional Behaviors

CAHSI students involved in Affinity Research Groups (ARGs) continue to outpace their national peers in NSF research experiences for undergraduates (REUs) in rates of academic presentation and publication. Almost all of the ARG students (95%) reported that they attended a professional conference, while only 23% of the national sample of REU students had done so. ARG students published in refereed journals at rates higher than the national REU sample: 15% of ARG students and only 5% of the national sample authored papers. ARG students also presented conference papers or posters at substantially higher rates than the typical REU student. All of these differences were statistically significant (Fisher’s exact test, p=.00001). Frequencies and percentages of student conference attendance and paper authoring for both the ARG sample and the national REU sample are presented in object 12.

<table>
<thead>
<tr>
<th>“In the past year I have…”</th>
<th># of ARG respondents (n=21)</th>
<th>% of ARG respondents</th>
<th># of national REU sample (n=464)</th>
<th>% of national REU sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attended a professional conference.*** Effect size = .364 (medium effect size)</td>
<td>20</td>
<td>95%</td>
<td>105</td>
<td>23%</td>
</tr>
<tr>
<td>Authored or co-authored a journal paper. *** Effect size = .361 (medium effect size)</td>
<td>3</td>
<td>14%</td>
<td>25</td>
<td>6%</td>
</tr>
<tr>
<td>Presented a conference paper or poster*** Effect size = .286 (small effect size)</td>
<td>14</td>
<td>66%</td>
<td>67</td>
<td>14%</td>
</tr>
</tbody>
</table>

***results significant at p=.00001, Fisher’s exact test

Object 12: Professional Activities of ARG Students Compared to Typical REU Students
Scholarship and Fellowship Applications

CAHSI ARG and Annual Meeting students engaged in other behaviors to advance their education and careers, such as graduate school and fellowship application. Thirteen students (43%) reported that they had applied for a fellowship, scholarship, or internship in the past year. Two Latinas from Electrical engineering programs at CAHSI institutions were awarded 2014 National Science Foundation Graduate student fellowships. Both were members of the CAHSI Fellownet program, and received assistance and guidance from CAHSI faculty in completing their applications. Aida Colon will attend Columbia University in the fall, while Kelly Mesa will complete her graduate education at Florida International University.

While CAHSI students have high aspirations for graduate school, few have taken the GRE in the past year. Only two students (8%) reported that they had taken the GRE in the past year. On the other hand, 15 students (62%) reported that they plan to take the GRE. Additionally, two students reported that they had applied and been accepted to graduate school. An additional 18 students (75%) plan to apply to graduate school.

Growth in Students’ Knowledge and Skills

Students gained the skills, knowledge, and confidence from ARGs that they will need in graduate school and in the computing workforce. Students’ highest gains were in intellectual growth. Students’ scores in intellectual gains suggest that they gained critical thinking and problem-solving skills as well as a deeper understanding of the research process. Students also reported positive outcomes on the collaboration scale which measures the extent to which leadership is distributed, the research group works cooperatively and other markers of a high-functioning Affinity Research Group. Students’ reported scores on the collaboration scale indicate that CAHSI Affinity Research Groups are operating with distributed leadership, individual accountability, positive interdependence and other hallmarks of the ARG model. Figure 4 below illustrates the scale means and standard deviations for the research gains scales (4-point scale in which 1=no gain, 4=great gain). The standard deviation of all of the scale means indicates that there was not a lot of variability in students’ responses. Indeed, most of students’ responses on all of the scales clustered around 3.0 or 4.0, with no students averaging below a 2.0 on any of the scales.

<table>
<thead>
<tr>
<th>ARG survey scale</th>
<th>Mean (4-point scale)</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intellectual Gains:</td>
<td>3.54</td>
<td>0.403</td>
</tr>
<tr>
<td>Critical thinking, problem-solving, understanding of the discipline, understanding of the research process</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Career Preparation:</td>
<td>3.48</td>
<td>0.591</td>
</tr>
<tr>
<td>Preparation for graduate school and career</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Personal Growth:</td>
<td>3.47</td>
<td>0.491</td>
</tr>
<tr>
<td>Self-efficacy, confidence in abilities, interest in computing, maturity, responsibility</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Object 13: Scale means and standard deviations on URSSA gains scales

There were few significant differences in gains among various sub-groups in the sample, suggesting that all students benefited from their ARG experience. There were no significant gender differences. Unlike in prior years where women rated their gains lower than men, there were no gender differences in this year. Women and men rated their gains equivalently on all scales, suggesting that women perceive the same benefits from research as their male peers. There were also no differences between Hispanic and non-Hispanic students, indicating that ARG experiences benefit all students.

Being a peer leader also boosted students’ oral communication, teaching, leadership, and interpersonal skills. Most peer leaders (94% of respondents) agreed or strongly agreed that being a peer leader had improved their oral communication skills. Almost all (97%) agreed or strongly agreed that PLTL had developed their teaching and leadership skills. All respondents agreed or strongly agreed that leading PLTL had improved their interpersonal skills (i.e., their ability to cooperate with others).

Object 14: Peer Leader Skill Development
Peer leaders were also confident in their understanding of key computing concepts. Most peer leaders believed that they are typically able to answer students’ computing questions: 91% agreed or strongly agreed that they could answer students’ computing questions, while 9% felt they could not. Peer leaders reported that leading PLTL increased their computing knowledge (79% agreed or strongly agreed with this statement).

**Object 15: Peer Leaders’ Knowledge of Computing**

**Belonging and Climate**

For the most part, CAHSI students responding to the Data Buddies survey demonstrated a greater sense of belonging and commitment to their discipline than the national sample of CRA computing students. CAHSI students felt that they “belong” in computing to a greater extent than their peers in other computing departments. In particular, CAHSI students expressed much greater confidence that they could complete a graduate degree than the national sample of students. On the other hand, CAHSI students expressed slightly less certainty that they could complete an undergraduate degree in computing than the national sample of students. This may be because of the greater financial constraints faced by CAHSI students.
Object 16: Comparison Data Regarding Student Belonging in Computing

Over the years, CAHSI departments have made an effort to foster student participation in computing clubs and professional chapters of computing groups. Indeed, CAHSI students report that they participate in computing-related groups at slightly higher rates than the national sample of computing students. Likewise, CAHSI students report much higher rates of participation in computing-related groups for minority students than the national sample of students. However, CAHSI students, on average report that they participate in groups for minority students somewhere between “rarely” and “sometimes.” Students may perceive that SACNAS or ARGS are CAHSI-related activities but may not be aware that other departmental activities, such as PLTL courses, are part of CAHSI. It may be important to continue to brand all alliance activities as part of CAHSI.
Object 17: Comparison Data Regarding Student Computing Participation

Networking and Support

CAHSI students report higher rates of networking with other students, professionals or faculty from outside their institutions than the national sample of computing students. In particular, CAHSI students report much higher rates of networking at national and regional conferences. To a lesser extent, CAHSI students report higher rates of networking at diversity conferences or through NSF Research Experiences for Undergraduates (REU).

Object 18: Comparison Data Regarding Student Networking

CAHSI students reported similar rates of faculty encouragement and support as the national sample of computing students. CAHSI students reported slightly higher encouragement to attend professional conferences, although they reported substantially lower help with making professional contacts. CAHSI students reported equivalent rates of one-on-one advising. While CAHSI provides plenty of opportunities for students to expand their professional networks through REUs, conferences and other opportunities, CAHSI faculty may keep in mind that students may need some help with facilitating introductions or contacts.
Object 19: Comparison Student Data Faculty/Staff Support

The CAHSI events at SACNAS also offered limited opportunities for students to network. Students expanded their networks at CAHSI events during the SACNAS conference, although not at rates seen in previous years, especially when CAHSI held its meeting apart from SACNAS. Almost two-thirds of students reported that the CAHSI events had helped them to meet computing students from other schools. However, fewer students reported that the events helped them to find a mentor. The limited nature of computing-specific and CAHSI-sponsored activities at SACNAS may have diminished the networking opportunities.

**Ratings of the quality of support provided by faculty and staff in the department**

CAHSI and CRA national sample

<table>
<thead>
<tr>
<th>Services</th>
<th>CAHSI</th>
<th>CRA national survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>One-on-one advising</td>
<td>3.58</td>
<td>3.62</td>
</tr>
<tr>
<td>Encouragement to attend professional conferences</td>
<td>3.19</td>
<td>3.12</td>
</tr>
<tr>
<td>Encouragement to participate in undergraduate research</td>
<td>3.12</td>
<td>3.27</td>
</tr>
<tr>
<td>Help with making professional contacts</td>
<td>2.97</td>
<td>3.31</td>
</tr>
</tbody>
</table>

Item means, 1=well below average, 5=well above average

**Student networking outcomes from CAHSI events at SACNAS (n=13)**

- Helped me meet computing students from other schools: 6% Not at all, 29% Somewhat, 41% A good deal, 24% A great deal
- Helped me find a mentor: 35% Not at all, 18% Somewhat, 18% A good deal, 29% A great deal
A case study of student support: CAHSI peer leaders

In May of 2014, California State University Dominguez Hills hosted the three day Peer Led Team Learning International Society conference. The theme was Peer Leaders as Agents of Change. The conference included attendees from 13 universities, with distance participation by panelists from four additional universities and institutions in the US and the UK. Six CAHSI universities were represented, though only two CAHSI departments were represented at the conference. The conference had a student focus, with opportunities for students to present their work via paper presentation and poster presentation. UHD provided much content for the conference, including 4 discrete offerings from computer science and Scholar’s Academy. Five upper level undergraduate students from UHD computer science and math participated. The evaluator held a focus group with students to understand how the conference as well as their local participation in peer led team learning influenced their learning.

Conference benefits

Attending the conference gave students an opportunity to learn teaching strategies from their peers and from professors engaged in high impact teaching practices. From descriptions of other school’s programs, they are also learning how schools have institutionalized PLTL in some cases, and how they use inventive arrangements to fund the workshops in other instances (e.g., selling workbooks, giving students course credit rather than pay for serving as peer leaders). Learning more about the practice of peer leading motivated students to continue their participation in the service at their local departments, and meeting professors from other institutions who are dedicated to student learning—they note they have two professors who are excited about student learning and mentoring but see less enthusiasm from other professors. Conference attendees mirrored their dedicated professors’ attitudes towards students. Based on this experience, peer leaders see an opportunity to collaborate at the peer leader level across CAHSI schools.

Building supportive community for student retention and advancement

Peer leaders are dedicated to supporting student learning at their university. They value the practice of peer leading, and see it as a way to build community among students as well as to support learning from a different perspective, via the peer leader. One leader noted the benefits of peer leading for creating classroom relationships: “You get the students together with each other and when you actually do physical workshops (versus online workshops) what you’ll find is that the students start making their own relationships, forming their own personal academic support group in addition to the academic support groups from the tutoring labs.” In this way, the student highlights how the benefits of PLTL transcend the time in the classroom and have a ripple effect in other aspects of students’ academic lives.

Innovating in PLTL- changing the format, keeping the ethos of peer leading

As computer science courses moved online, it was important for departments to keep the services of PLTL yet redefine its delivery. An important goal of the computing department was to keep to the ethos, or culture and spirit of peer leading (e.g., student guidance, nurturing mentoring relationships, valuing of multiple paths to an answer). UHD developed synchronous, online workshops in which leaders guide student activity through voice and screen visualization while
students contribute to the dialogue via audio or chat message. A student describes a balancing act peer leaders must perform where they improvise yet come prepared. This balancing act is heightened when leading workshops online:

“For online workshops a lot of times we are the moderators because the goal of the workshop is for students to understand and get to the algorithm that may solve the problem. We have to think on our feet because we don’t have face to face interaction. We have to think of questions to guide them where they need to get to, so we know they understand the course material.”

Leaders describe the ways that they lead online, indicating they do a lot of questioning to allow students to arrive at the next step in their learning. In some cases, leaders of online workshops facilitate discussion across members, asking them to figure out how two of the participants got differing answers for example. In this way, the “correct” answer is not fed to the students, nor is being wrong something to be ashamed of— it is merely a place to begin dialogue. Another strategy used to ensure that students lead the learning in an online session was described by a senior peer leader:

“A thing the e-board system makes a little more difficult is that really only one person should be controlling (the screen)... that’s where the leading questions come in... I won’t put anything on the board until they tell me it should go there.”

CAHSI peer leaders from UHD are becoming adept at the online format for guiding student learning. They have found ways to adapt their peer leading to remain student centered and help students at a distance. Students were involved in curriculum development for PLTL in CS2, indicating they are not only taking up the practice but also leading its development. Their dedication to PLTL is evident during the focus group, where the team digresses for a few moments to discuss instructional strategies they found useful amongst themselves. The PLTL conference gave an opportunity for leaders to connect with one another and share experiences, with local partners as well as with peers from other schools.

“I came to college from parents who never finished high school and basically being the black sheep of family. It’s really hard having a lot of confidence in yourself. When I was in high school, I was like, “Okay, Biology. I’m good at that.” I started as a major in microbiology, saw friends that were doing computer science and math and I was like, “I was always good in math.” I’m always a nervous wreck and panicking about everything that I do but when I saw friends getting into PLTL and getting to have that reinforcement that they know what they are talking about and knowing what they just learned can help other people.

I was like, “I’m going to hang out in the (computer science tutoring) lab.” Slowly but surely I took the C++. Did I struggle? Yes I did. Was I in the lab? From time to time, yes. But I like a challenge even though I always doubt myself a little. It changed me. This whole experience changed me because I’m not afraid to try new things even though I think I may fail. It changed a lot. When I started college, I was like, ‘I’m just going to do a bachelors.’ Now, as I keep going with it, I keep trying to think maybe I might want to get a Masters.”
Learning by Leading

Leaders describe how the strategies they learn in PLTL training and “on the job” in peer leading sessions assist them in their own learning in multiple ways. First, one participant said that as he became familiar with the newly developed CS2 PLTL lessons, he found a new understanding of the topics presented in the course. Another leader described the need to know the material in multiple ways, or understand it from a variety of perspectives in order to be successful: “We’re helping people grow in understanding and be able to think critically. In order to foster that with other students you have to be able to do it yourself so it definitely changes how you think about the material.” Another leader described how he often treated himself like he would a student when studying for a test, applying the principles of being able to explain material as the best measure of understanding: “For me in my regular courses, whenever I learn something I always put it in the context if I were to explain it to other students how would they go about doing that? My thought process changed to be like that. If I can explain the material to others then that’s how I know I learned it myself.”

In the peer leader survey, students were asked whether they received the support they needed to be effective PLTL leaders. All 29 question respondents answered that they had received the support they needed. Most respondents provided additional information about what specifically supports them in being effective peer leaders.

Eight students reported that they were given the resources they needed, such as computing resources that included tools and equipment, space in an appropriate room at a good time, faculty and staff available to answer questions:

- All instructors with courses that take part in PLTL programs have been available whenever needed and without question.

Nine peer leaders explained that they felt they had a support system in their fellow leaders and the PLTL coordinators. These answers went beyond the ones that spoke of particular questions being answered or materials being supplied. In these responses, students used words such as “network” and support system” and “advice”; the words of these students indicated that they had relationships with others that gave them confidence and aided them in their work:

- My fellow leaders, as well as my PLTL coordinator, have given me an incredible amount of support. They are always willing to give advice and I am always learning from them by example.
- I have network of fellow peers to help me prepare and understand a concept. My fellow peers ensure I feel comfortable with all concepts and ready to help others. I never feel alone or scared.

Seven students wrote about training sessions that have helped them be effective peer leaders:

- Learning about all the different learning styles was great. I also enjoyed the scenarios we acted out and reflected on how to respond to such scenarios.

In conclusion, peer leading is a highly valuable and meaningful experience for students. The experience increases their confidence in computing, their knowledge of the field, and creates a community of academic support for peer leaders and students.
Common Core Indicator #2: CAHSI Organizational Capacity

In this section, we highlight an effort to understand collaborators’ views of the CAHSI Alliance and assess how CAHSI has made progress towards creating change in computing education for Hispanics within its membership. The rubric developed to measure organizational capacity via a healthy pipeline of interested and qualified students, resource development and training, faculty/staff engagement, and financial sustainability.

CAHSI Network Assessment of Collaboration

In the spring of 2014, CAHSI PIs were asked to complete an internal social network analysis. The purpose of the study of the internal network was to understand collaboration as it occurs across CAHSI partners. The evaluation team used the research-based Partner Tool (partnertool.net) to explore how organizations in the alliance are working together, assess where and how the collaborative should strengthen their partnerships, and to chart progress in the relationships built and activities accomplished in CAHSI.

Visualizing the CAHSI network

The charts that appear below depict different aspects of the network as it existed in 2014. Triangles represent originating institutions and squares represent new CAHSI member institutions. The network appears robust, with all institutions showing at least three connections that are made quarterly. Nearly all originating institutions have more frequent communication with at least one other institution in the alliance. All originating institutions and two newer members engaged in integrated activities with Alliance partners, the most developed form of collaboration monitored in this survey. Intensity of collaboration is moderately but not completely correlated with frequency, meaning that some interactions occur more often between two institutions but to lesser degrees of intensity. In object 23, it becomes clear that 4 institutions are most central in CAHSI integrated activities. They, in turn, connect with all other institutions, with lots of redundant relationships (meaning most institutions connect with multiple partners). Object 24 shows that length of time in the alliance influences trust of institutional partners, yet the impact is uneven when considering time as the only factor, indicating other variables come to bear regarding trust.
Object 21: The CAHSI network-lines represent contact that occurs at least quarterly and line thickness indicates frequency of contact. Centrality in the map relates to number of connections to other CAHSI institutions.

Object 22: The CAHSI network-lines represent contact that occurs at least quarterly and line thickness relates to the intensity of collaboration (range is from coordinated to collaborative to integrated activities). Centrality in the map relates to number of connections to other CAHSI institutions.
Object 23: The CAHSI network - lines represent partner pairs that developed integrated activities together, in which activity planning and implementation occurred in concert. Centrality in the map relates to number of connections to other CAHSI institutions.

Object 24: The CAHSI network - lines represent contact that occurs at least quarterly. Node size relates to overall Value score. Centrality in the map relates to number of connections to other CAHSI institutions.
Institutional representatives were asked to describe which resources they contribute to the alliance. Survey respondents indicate from 5 to all 13 of the listed contributions. Overall contributions are tabulated in the chart below.

<table>
<thead>
<tr>
<th>Contribution</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Policy efforts to improve educational opportunities for Hispanics in computing</td>
<td>5</td>
</tr>
<tr>
<td>Advocacy for Hispanics in computing</td>
<td>7</td>
</tr>
<tr>
<td>Facilitation/Leadership</td>
<td>6</td>
</tr>
<tr>
<td>Research opportunities for promising (not always high achieving) students</td>
<td>6</td>
</tr>
<tr>
<td>Connections to industry partners</td>
<td>3</td>
</tr>
<tr>
<td>Scientific or technical knowledge/ expertise</td>
<td>8</td>
</tr>
<tr>
<td>Specific knowledge/expertise regarding educational practice in an HSI setting</td>
<td>5</td>
</tr>
<tr>
<td>Providing information/feedback regarding CAHSI initiatives</td>
<td>6</td>
</tr>
<tr>
<td>Staff/faculty time for reviewing/editing student work</td>
<td>7</td>
</tr>
<tr>
<td>Staff/faculty time for mentoring students</td>
<td>8</td>
</tr>
<tr>
<td>Staff/faculty time for implementing initiatives (e.g., PLTL, ARG, Fem Prof/Mentor Grad, CS-0)</td>
<td>7</td>
</tr>
<tr>
<td>Staff/faculty time for training others in CAHSI initiatives (e.g., peer leaders, CS-0 instructors, ARG faculty)</td>
<td>7</td>
</tr>
<tr>
<td>Target students who participate in CAHSI-wide activities (e.g., the SACNAS conference)</td>
<td>6</td>
</tr>
</tbody>
</table>

_object 25: CAHSI Members’ Contributions to the Alliance_

Related to its tradition as a grass roots effort, the contribution widely cited as most important to CAHSI involved staff time and student participants.
Measures of Trust and Reliability across Alliance Partners

Those who responded to the Internal Network survey gave feedback regarding each member’s trust and reliability, from their perspective. In other words, the PI at New Mexico State University would rate his level of trust of the California State Dominguez Hills computing department, and so on. Average overall trust scores were relatively high, with an overall rating of 87.5% and individual institution scores ranging from 2.89 to 3.84 (on a 4-point scale). Of the three related items that combine to form overall trust, “reliability” and “openness to discussion” garnered higher results than the item regarding “support of mission.” Institutions that joined CAHSI at later dates were ranked lower on trust than the originating institutions.

Measures of Value to the Organization across Alliance Partners

Overall value scores were calculated based on three concepts that, according to research on networks, prove valid measures of members’ importance in the alliance: “resource contribution,” “power and influence,” and “level of involvement.” Value of individual members was rated as varied, with longevity in the program seeming to contribute somewhat to more positive ratings. Overall averages ranged widely from 1.67 (between not at all and somewhat valuable) to 3.94 (nearly very valuable) on a 4 point scale. Two institutional members, with little to no representation in CAHSI events and meetings over the past year, scored 2 or below on average across “value” items. Two other newer members had some average scores between 2 and 3 (somewhat and moderately valuable), while all original institutions averaged between 3 and 4 on all items. The greatest variability by specific value topic was “resource contribution, which spanned 1.33 to 3.83 across institutions.

CAHSI’s Outcomes and Potential Outcomes

Alliance representatives were asked to indicate which outcomes they felt CAHSI was trying to achieve as an Alliance. Overall, outcomes related to student achievement and educational quality, followed by resource development, and dissemination were indicated as outcomes while goals related to communication and infrastructure for collaboration (e.g., community support across sectors) were less popular across institutions. The most important goals numbered only 3 across 8 respondents. Graduate school interest was highest (50%) followed by increasing underrepresented
students in computing at CAHSI schools (37%) and increase knowledge sharing of best practices for Hispanic students (13%).

**Level of Success Achieved, Secrets to Success**

Most respondents consider CAHSI very successful (75%), though none of the respondents deemed it completely successful. The Partner Tool provides multiple research-based responses for Alliance representatives to mark as impactful in CAHSI’s success. All elements were chosen by at least 3 participants (38%), indicating multiple factors are responsible for programmatic achievements. The most commonly selected characteristics of the alliance were shared mission, shared resources, and exchanging knowledge (75% for each element).
Outcomes of CAHSI, as indicated by CAHSI PIs (n=8 respondents)

- Increase in number of Hispanics interested in graduate education in computing: 8
- Increase in number of Underrepresented (e.g., Hispanic, female, Native American, African American) students studying computing in CAHSI schools: 8
- Increased knowledge sharing of best practices in computing education recruitment and retention: 7
- Increased knowledge sharing of best practices for Hispanic students: 6
- Improved quality of computer science higher education: 6
- Public awareness of computing as a viable career option: 5
- Increased sense of belonging/community among Hispanics in computing fields: 5
- Increased knowledge sharing of best practices in K12 outreach: 4
- Improved resource sharing across CAHSI schools: 4
- Community support ACROSS sectors (e.g., industry, education, policy makers, funders): 3
- Improved communication among computer science education stakeholders: 1

Object 27: CAHSI Outcomes

CAHSI PI's assessment of most important goals (n=8)

- Increase in number of Hispanics interested in graduate education in computing: 50%
- Increase in number of Underrepresented (e.g., Hispanic, female, Native American, African American) students studying computing in CAHSI schools: 37%
- Increased knowledge sharing of best practices for Hispanic students: 13%

Object 28: CAHSI's Most Important Outcome
Object 29: CAHSI PI’s Assessment of CAHSI’s Success

How successful has CAHSI been at reaching its goals? (n=8, 5 point scale)

Object 30: CAHSI Secrets of Success, PI Report

CAHSI Organizational Capacity rubric

As in each year of the current funding cycle, the evaluators measure CAHSI against the research-based rubric of organizational capacity. In the case of CAHSI, sustainability depends on departmental development of capacity to support CAHSI activities as well as Alliance level abilities.
to continue and advance the organizations’ goals. The rubric appears below with the key to interpret findings. Each row is described in detail when applicable data was collected for the year.  

In the 2013-2014 year, the following schools participated in the evaluation of organizational capacity: NEIU, UHD, TAMUCC, UTEP, FIU, UPRM, CSUDH, & NMSU
### CAHSI Organizational Capacity Rubric:

- **Green** color indicates school or department is achieving the goal.
- **Yellow** indicates partial fulfillment.
- **Light blue** indicates rubric metric not measured this year.
- **Black** indicates no progress towards fulfillment.
- For sustainability, **black** indicates no additional funding, **yellow** indicates partial fulfillment via other means, and **orange** indicates fully “other” funded.
- **Pink** indicates the cell is N/A.

<table>
<thead>
<tr>
<th>Indicator (colors used to show different types of indicators)</th>
<th>S 1</th>
<th>S 2</th>
<th>S 3</th>
<th>S 4</th>
<th>S 5</th>
<th>S 6</th>
<th>S 7</th>
<th>S 8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Healthy Pipeline</strong>: K12 outreach using CAHSI initiatives (e.g., CS-0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthy Pipeline</strong>: faculty/staff or students have continued to innovate in course pedagogy (e.g., experimenting with new initiatives, finding new ways to study initiatives underway)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthy Pipeline</strong>: graduate school preparation (goal is 15% of departmental students)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthy Pipeline</strong>: CAHSI graduate application (as defined by intent, measured across departments, above baseline for 2010 annual meeting rates)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Healthy Pipeline</strong>: CAHSI graduate application (as defined by application to graduate school, measured across departments, above baseline for 2010 annual meeting rates)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resource Dev Train</strong>: host training in 1 or more CAHSI initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Resource Dev Train</strong>: lead training in 1 or more CAHSI initiatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fac/staff engagement</strong>: undergraduate faculty CAHSI awareness measured every other year (75%) fac survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fac/staff engagement</strong>: fac CAHSI participation (33%) fac survey</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fac/Staff engage</strong>: undergraduate faculty CAHSI-trained continuously (e.g., every other year participate in training)(25%) PI report</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CAHSI Alliance sustainability</strong>: funds for CAHSI supplemented at the department/institutional level - CS0 outreach</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAHSI Alliance sustainability: funds for CAHSI supplemented at the department/institutional level</td>
<td>CS0 undergrad</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAHSI Alliance sustainability: funds for CAHSI supplemented at the department/institutional level</td>
<td>PLTL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAHSI Alliance sustainability: funds for CAHSI supplemented at the department/institutional level</td>
<td>ARG</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAHSI Alliance sustainability: funds for CAHSI supplemented at the department/institutional level</td>
<td>mentorgrad/fellownet/femprof</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Healthy pipeline:

All of the schools participated in some form of outreach work that built on CAHSI initiatives, primarily CS-0, to deliver computing content to K12 audiences (8 of 8, 100%). Many of these occurred in conjunction with Computer Science Education Week and the Hour of Code promoted through Code.org. The majority of schools have seen innovation in pedagogical practice in the past year (6 of 8, 75%). These innovations involved adding new dual enrollment courses through collaborations with CS education initiatives, developing cooperative learning in new courses (an element of PLTL), extending CS-0 curriculum and experimenting with new learner-centered pedagogies, such as supplemental instruction and online sessions for PLTL. These innovations could be developed for implementation across CAHSI, once they are deemed effective in the HSI computing department settings, and the evaluators will work with interested faculty in evaluating new initiatives in the coming year. In some cases, it is important to document these innovations, particularly because they are undertaken by students who will not remain in the institution long—documenting what works will also support local longevity of curricular innovation. Ensuring students have access to graduate school preparation has been declining in recent years—only 2 schools have fulfilled the 15% student preparation goal (25%) and 4 (50%) have partially fulfilled this goal. The increase in enrollment across programs has had some influence— as the number of students grows (the denominator) it becomes harder to reach the 15% goal. Ensuring larger numbers of students attend SACNAS and Grace Hopper in the coming year to receive such professional development may increase CAHSI’s success in this area. CAHSI institutions may also need to reenergize local workshops to improve student knowledge of graduate school options, and create more incentives for computer science students to attend. While a larger portion of undergraduate students have intentions to attend graduate school in the future, nearly doubling from 2012 numbers (75% versus 61%, 44% in 2012) fewer had applied at the time of the CAHSI annual meeting survey (8% versus 11%). The practice of enrolling and applying to MS programs, often at the home institution in the summer months may be affecting this data. Evaluators will reconsider how to obtain this data in a timely way given the atypical graduate school attendance and application practices of HSI computing students in CAHSI.

Faculty/staff engagement and training

Over half of the CAHSI institutions held a training in the past year (5 of 8, 63%) and half hosted such a training (4 of 8, 50%). Training funding (e.g., travel for training, materials, space) may need to be pursued separately, especially as CAHSI faculty experiment with new pedagogical approaches across multiple campuses and grants that fund trainings are no longer available. CAHSI institutions do retain trained faculty within
their departments, and three quarters (6 of 8, 75%) boast at least 25% of their undergraduate faculty participate regularly in CAHSI initiatives and training, while the other 2 have partially fulfilled this goal. Having a cadre of involved faculty is essential for sustainability beyond the years of the CAHSI grant, and as CAHSI faculty transition to new roles and to retirement there is a need to consider incentives and opportunities to bring new faculty into the fold.

**Funding Sustainability**

All of CAHSI’s outreach efforts are funded via other means such as institutional funding and grants from the National Science Foundation and other agencies—in fact many faculty did not complete this item presumably because they do not consider outreach as a cost related to CAHSI. CS-0 has again been fully institutionalized at all CAHSI schools, indicating it will definitely live beyond the CAHSI granting cycle as long as faculty members across schools are trained in its implementation. Peer-led Team learning has been institutionalized or incorporated as a volunteer (zero cost) effort at all schools (80%). ARG is funded through other, non-CAHSI means at 3 of the 5 applicable institutions (60%) though one school remains fully CAHSI funded (2 of 5, 40%) for undergraduate research. Mentorgrad remains difficult to support through new means—of the 5 schools that continue to provide the initiative for students, three rely on CAHSI for all of the funding and one receives partial CAHSI support. This may be an initiative to attempt fund via industry, as nearly all monies go to students directly and the students could potentially complete research applicable to industry needs.

**Common Core Indicator #3: CAHSI Alliance Impact**

This year, a study of external partners serves as additional evidence and an external perspective on the Alliance. This section of the report includes a detailed analysis of partners’ experiences with CAHSI as well as a completed Alliance Impact rubric for the 2013-2014 year.

**CAHSI social network survey**

Twenty four current or past partners were invited to complete the CAHSI external network survey. The instrument was designed based on social network analysis theory, though its focus was on the external collaborators’ view of CAHSI as a contributor, organizer, agent of change, and collaborator rather than on the network as a whole.\(^4\) Multiple reminders were sent to improve response rates. Ten completed the

---

\(^4\) This focus on CAHSI rather than the scope of relationships across partners was due to CAHSI’s current collaboration model, in which CAHSI’s external partners are not necessarily connected to one
instrument, one declined to complete the instrument based on the amount of time that had elapsed since the organization partnered with CAHSI. Survey participants represent non-profit organizations, academic institutions, and corporations. Two of the non-profits address under-representation in computing specifically or STEM more generally. One participant is engaged in the NSF Broadening Participation in Computing community.

**CAHSI Network Partner Contributions**

Survey respondents listed the contributions they made to CAHSI during their partnership. Network partners averaged 5.6 contributions, and the partners ranged in number of contributions from 1 to 10 out of 15 possibilities listed. Of the 15 listed contributions to CAHSI, funding was the only one with no partners involved. This is not surprising, as to date most monetary contributions have been from the National Science Foundation, while in-kind donations have been obtained from partners (e.g., room space, scholarships, mentor time, etc.). All other contributions were mentioned by at least 2 partners. See the charts below, where contributions are divided into two general subtypes, advisory/political and educational/technical.
Object 31: Advisory/Political CAHSI Partner Contributions

Which of the following do you or your organization provide CAHSI?

- Advocacy for Hispanics more generally: 30%
- Advocacy for Hispanics in computing, or STEM more generally: 40%
- Facilitation/leadership: 60%
- In-kind donations for CAHSI events or initiatives (use of building space, technical equipment): 30%
- Funding for CAHSI events or initiatives: 0%
- Feedback regarding CAHSI initiatives (e.g., CS-0, PLTL, ARG, professional development workshops): 30%

Object 32: Educational/Technical CAHSI Partner Contributions

Which of the following do you or your organization provide CAHSI?

- Advising/mentoring of students: 80%
- Professional development workshops for CAHSI students: 40%
- Internships for CAHSI students: 50%
- Research opportunities for CAHSI students: 20%
- Connections to industry partners: 60%
- Scientific or technical knowledge/expertise: 50%
- Specific knowledge/expertise regarding educational practice in Hispanic-serving institutions: 20%
- Specific knowledge/expertise regarding educational practice in higher education: 30%

Assessment of CAHSI as a partner

Partners were asked to describe the strength and quality of their relationship with CAHSI along three elements: reliability, mission congruence, and openness to discussion. These items were along 4 point scales. All respondents scored CAHSI on the
3rd or 4th levels of the scale, the most positive. Reliability received the highest marks across participants—75% of those who responded to the item indicated CAHSI was “very reliable” (mean of 3.75 on a 4 point scale). Partners indicated alignment with CAHSI’s goals, which gives evidence that CAHSI is partnering with like-minded organizations and individuals (55% alignment, 45% a great deal of alignment, mean of 3.45 on a 4 point scale). Dialog is open between partners, according to CAHSI partners. 55% view CAHSI as open to discussion, and 45% view the organization as “very open” (mean of 3.45 on a 4 point scale).

**Nearly all partners perceive CAHSI as “very” to “completely” successful, powerful**

Partners responded to an item describing their assessment of CAHSI’s success on a 5-point scale (not at all successful to completely successful) with an alternative “I don’t know, too soon to tell” option. Two thirds of respondents (6 of 9) indicated 4 out of 5 (very successful), two specified 5 out of 5 (completely successful) and one respondent stated it was too soon to tell if CAHSI has been successful, an average of 4.25 on a 5 point scale. CAHSI partners perceive CAHSI as a powerful organization which uses its influence to achieve its goals. Three quarters of respondents state that CAHSI’s power and influence are “very valuable” in achieving its mission, when power and influence are defined as “holding a prominent position in the community by being powerful, having influence, being successful as a change agent and showing leadership.”

**CAHSI’s strengths**

The list of strengths partners provided were varied, which may indicate a robust organization with many positive elements, or may reflect the multitude of partnership types in which CAHSI engages. Five of the responses (55%) indicated some aspect of student-level work, including a strong mentoring model for students, outreach activities, specific messaging and targeted directives that help students achieve in computing. Organizational strengths described include strong leadership (2 of 9), broad impact across like institutions, a clear and compelling mission, and learning organization orientation (e.g., learns from evaluation).

**Future collaborations**

Partners’ responses indicate intentions to collaborate at similar to greater levels with CAHSI in the future. Some respondents wish to amplify the impact of CAHSI by expanding CAHSI’s reach through partner networks (3). Half of those who responded to this item described a desire to continue collaborations that provided programming to students in the form of workshops and conferences.
CAHSI Alliance Impact Rubric

In this section, the evaluators present the achievements of CAHSI as they pertain to the research-based Alliance impact rubric. Results are discussed following the completed rubric.

<table>
<thead>
<tr>
<th>IMPACT INDICATOR</th>
<th>Beginning/needs substantial improvement</th>
<th>Moderate/needs some improvement</th>
<th>Proficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. CAHSI Alliance impact: CAHSI annual meeting resourced through other organizations/funding sources</td>
<td>Travel scholarships for some students covered; else CAHSI funded</td>
<td>Site collaborations lead to shared costs for annual meeting site, some travel covered by scholarships, funding from industry, related grants</td>
<td>Annual meeting speakers, faculty and student travel scholarships, and site costs covered by non-profits, industry support, endowments, or institutional funds</td>
</tr>
<tr>
<td>2. CAHSI Alliance impact: social science engagement</td>
<td>Evaluation report data focusing on social science elements of CAHSI disseminated (baseline practice)</td>
<td>One to two social scientists well versed in higher education, Hispanics in education, and or STEM education collaborate with CAHSI and produce 1-3 disseminated works</td>
<td>Three or more social scientists well versed in higher education, Hispanics in education, and or STEM education collaborate with CAHSI and produce 4 or more disseminated works</td>
</tr>
<tr>
<td>3. CAHSI Alliance impact: policy voice [annual activity]</td>
<td>1-2 national or regional venues</td>
<td>Less than 5 national or regional venues</td>
<td>Multiple CAHSI PIs served as CAHSI delegates to higher education and STEM education organizations in leadership roles in 5 or more national or regional venues across a spectrum of organization types. PIs discuss lessons learned from CAHSI rather than focusing</td>
</tr>
<tr>
<td>CAHSI Alliance impact: faculty dissemination – education</td>
<td>4-6 engaged PIs/faculty publishing or presenting in more than 3 total venues</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. CAHSI Alliance impact: cyber infrastructure to support broader educational impact via web dissemination</td>
<td>1-3 CAHSI institutions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. CAHSI Alliance impact: cyberinfrastructure national impact via web dissemination</td>
<td>Each CAHSI institution is involved in a collaborative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. CAHSI Alliance impact: cyberinfrastructure to support collaboration</td>
<td>Cyberinfrastructure metric to be determined: focus is on research collaboration, usability, and quality of communication – survey of users to be developed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. CAH$SI$ Alliance impact: cross institutional funding-educational initiatives</td>
<td>1-3 CAH$SI$ institutions</td>
<td>4-6 CAH$SI$ institutions</td>
<td>Each CAH$SI$ institution is involved in a collaborative research grant/grant proposal that supports continued contact and scholarship among students and faculty</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>10. CAH$SI$ Alliance impact: leveraging CAH$SI$ for new institutional funding</td>
<td>1-3 CAH$SI$ institutions</td>
<td>4-6 CAH$SI$ institutions</td>
<td>Each CAH$SI$ institution is involved in a research grant/grant proposal that leverages CAH$SI$ results, outcomes, and/or initiative strategies to develop new programs</td>
</tr>
</tbody>
</table>
| 11. CAH$SI$ Alliance alignment of goals within institutions**: 5 | 0-40% of member institutions | 41%-99% of member institutions | All CAH$SI$ institutions have documented engagement from vertical or horizontal colleagues that indicates acknowledgement of how CAH$SI$ aligns with institutional efforts that span departments/colleges/schools.

---

---

5 This rubric indicator has been revised to show how alignment is acted upon within institutions, rather than to show how alignment is promoted through documentation and publicity.
CAHSI Annual Meeting: Regarding sustainability of the CAHSI annual meeting, the CAHSI alliance scored in the “moderate/needs improvement category (2 of possible 3). The organization is entering its third year of a five year agreement with SACNAS to share site space, receive administrative support in processing CAHSI student travel, and getting access to content in exchange for providing computer science leadership, technical content, and faculty mentors for the SACNAS conference. CAHSI has used other grant funding to send students to the conference, but student travel scholarships are still largely funded by CAHSI which must be addressed in coming years. CAHSI leadership is considering reviving the original meeting so that students receive the community, skill development, and opportunity to meet Hispanic mentors that was occurring in the past. CAHSI plans to attract industry funders to support and provide content to CAHSI students (e.g., specific industry training that occurs with limited scope in CAHSI institutions already, e.g., IBM initiatives at UTEP).

Social Science Network: Little progress has been made towards reviving a social science network that moves beyond the evaluation team (score 2 of 3). One activity occurred with social scientists outside of CAHSI. It is unclear at this point whether this goal is a priority of CAHSI. It may be appropriate to focus attention on research-based educational practice and advisement from social scientists, including the evaluation team, rather than on developing research collaborations at this stage in CAHSI’s lifespan. A barrier has been a lack of funding for social scientists to explore questions of interest in the CAHSI community.

CAHSI Advocacy: Leadership and support of CAHSI in higher education and STEM education organizations is spreading across CAHSI leadership. Nine faculty members from 7 institutions serve as CAHSI delegates to national and regional organizations
interested in improving and diversifying the computing workforce, and or in improving educational opportunities for Hispanic students CAHSI has continuously scored 3 out of 3 on this metric, having representation with 6 venues.

**CAHSI dissemination:** Nine citations were found and/or reported. Works were found in local, regional, and national conferences, book chapters, and journals. Faculty turnover and grant sunsets related to educational innovation has impacted the amount of faculty dissemination that occurs regarding education, however students are beginning to disseminate CAHSI resources and activities in venues outside of CAHSI (e.g., PLTLIS, CCWIC). As students become increasingly involved in the curricular implementation and innovation of CAHSI (e.g., through outreach, course development, lesson creation and adaptation), providing them with the resources they need to promote CAHSI innovation, such as funding for conferences, publishing advice, and assessment skills needed to measure impact. The evaluation team could assist in such professional development if pursued.

**Web dissemination:** Creating initiative materials that would support direct download and implementation of CAHSI initiatives has been an ongoing challenge. In part, this is due to the hands-on, collaborative nature of CAHSI’s training practices within the organization—most implementation across campuses has occurred over time with face to face relationships built between collaborators. Another issue has been in developing a documentation format that would work across institutions so that each school could import their sample lessons and materials in a coherent way. With the redesigned website, fewer initiatives have downloadable materials (only 3 of 5). CAHSI initiatives have materials available online that would support at least initial implementation of CAHSI initiatives in new locations, though the default has been to include materials primarily from the lead institution, which was the case in previous years as well. Materials include lesson plans, sample workshop resources and reference manuals; however, diversifying these materials across institutions is needed to showcase the multitude of approaches to the initiatives. CAHSI scores with 2 out of 3 on this metric.

**#6: NOT EVALUATED THIS YEAR**

**#7: NOT EVALUATED THIS YEAR**

**EDUCATION FUNDS:** Five CAHSI institutions engaged in cross-institutional educational initiative proposal writing/grant implementation during the 2013-2014 school year, missing the target of all institutions proposing or receiving funds for educational initiatives (5 of 8, “moderate/needs improvement” score on the rubric). Few were involved in cross institutional collaborations, however. Informal interviews with PIs indicate a shift towards internal, cross disciplinary funding efforts in education, such
as partnering with the math department to propose grant funding for PLTL. Creating opportunities for CAHSI faculty to develop proposals together could enhance collaboration across institutions and spur educational innovation.

**COLLABORATION ON TECHNICAL EFFORTS:** Only two institutions have collaborated in this way in the 2013-2014 reporting year. Interview and survey data indicate faculty, particularly junior faculty, would like additional opportunities to pursue this type of collaboration, which is typically not part of SACNAS all-hands meetings. Lack of faculty opportunity to meet, via all-hands, CAHSI, or SACNAS meeting opportunities, may be stifling these efforts. Carving out time to create research proposals that span multiple CAHSI schools may improve sustainability in ARG funding for students as well as create opportunities for faculty and student collaboration beyond the years of the CAHSI grant.

**LEVERAGING CAHSI:** Nearly all schools had developed a research proposal that leveraged CAHSI (6 of 8 analyzed this year), which makes 15 proposals over the year. In some cases, proposals would extend CAHSI initiatives like PLTL to other departments within an institution, would promote student researchers through ARG, or introduce proven mentoring strategies to undergraduate and graduate education environments. Many of the grants are still pending review, so the impact beyond the CAHSI alliance is difficult to predict at this time.

**CAHSI’S WITHIN INSTITUTION VISIBILITY:** As CAHSI expands and influences other educational entities, its capacity to serve as a model at home institutions for increasing equity and promoting student advancement is important to consider. This visibility may enhance the longevity and sustainability of CAHSI practices within an institution beyond the scope of the CAHSI grant. Concrete, evidence of leadership behavior that indicate institutions are connected to the CAHSI mission and in alignment of its goals can be found in four institutions. At these schools, institutional leaders are engaging CAHSI PIs and faculty in formal dialog about leveraging their work in other departments, are partnering with CAHSI to seek funding to support the spread of CAHSI within STEM, and are bringing CAHSI faculty and practices into larger projects that serve the institution as a whole. As CAHSI PIs take on greater leadership responsibilities locally (e.g., as department chairs become deans/associate deans), there may be additional opportunities to demonstrate CAHSI’s alignment with university goals and initiatives.

**CAHSI IN POLICY:** The CAHSI PI has engaged in public acts that influence policy in three documented instances over the past year [serving on the Excelencia board, writing a position paper with SACNAS leadership, presenting to the Committee on Equal
Opportunities in Science and Engineering (CEOSE), a congressionally mandated advisory committee to the National Science Foundation. These public acts are valued for the ways in which they make CAHSI visible, show its success as an Alliance, and indicate that others perceive CAHSI to be a united voice for Hispanics in computing.

**CAHSI GROWTH IN ADOPTION:** CAHSI met this goal early in its new grant cycle. One institution has added CAHSI practices in the past year (El Paso Community College). Continuing to monitor growth and adoption will be important for making decisions about full membership in CAHSI in the future.
Appendix: Data Collection Methods and Survey Samples

Affinity Research Group Survey

In all, 27 CAHSI students completed the modified Undergraduate Research Student Self-Assessment (URSSA) survey in spring 2014. Many students (33% or 9 students) were from University of Puerto Rico, Mayaguez. Additional CAHSI schools that were represented are: University of Texas, El Paso (7% or 2 students), Texas A&M Corpus Christi (15% of 4 students), University of Houston, Downtown (15% or 4 students), California State University, Dominguez Hills (26% of 7 students), and Northeastern Illinois University (4% of 1 student).

The respondents were primarily seniors (52% of 14 respondents) and juniors (26% or 7 respondents). A few survey respondents were graduate students: Master’s students (7% of 2 respondents) and Ph.D. students (7% or 2 respondents).

Women were represented in CAHSI ARG groups in higher proportions than they are nationally in undergraduate computing programs. Women represented 25% of ARG students, while women comprised only 13% of computer science bachelor’s degree recipients in the nation. CAHSI faculty, therefore, are recruiting higher than average rates of women into research group which, in turn, may enhance their retention in the discipline.

Hispanics were also represented in ARGs at much higher rates than their national representation in computing (approximately 8%). Fifty-seven percent of the ARG students were Hispanic. Additionally, 22% identified as African-American and one student identified as Native American. Thus, 71% of CAHSI ARG students are from underrepresented minority groups.

Many ARG students were first-generation college students as well. Respondents were asked about their mother’s (or closest female parental figure or guardian) highest level of education. One-third of students responded that their mother or maternal figure had not earned a college degree. Likewise, 50% of students answered that their father or paternal figure did not have a college degree.

CAHSI/SACNAS Annual Meeting Survey

In October, 2013 CAHSI held its annual meeting in San Antonio, Texas in conjunction with the Society to Advance Chicanos and Native Americans in Science
(SACNAS) annual meeting. CAHSI events during the SACNAS conference included a CAHSI symposium on the first evening of the conference, conversations with scientists (Computing disciplines), and Computer Science and Computer Engineering student poster session.

In March, 2013, a follow-up survey was distributed to all student participants of the SACNAS conference. The six-month window allowed students time to reflect on how the conference may have benefited them and influenced their professional goals. The survey also assessed the influence of the conference on students’ interest and confidence in computing research as well as their ability to find mentors at the conference.

This year, 45 CAHSI students registered for the CAHSI events at the SACNAS conference. Of these students, 13 completed the annual meeting follow-up survey. According to registration lists for the CAHSI symposium, CAHSI students from the following thirteen universities were represented:

- California State University, Dominguez Hills
- California State University, San Marcos
- Florida International University
- Miami Dade College
- New Mexico State University
- Northeastern Illinois University
- Polytechnic University of Puerto Rico
- Texas A&M University-Corpus Christi
- University of Houston-Downtown
- University of Puerto Rico at Mayaguez
- University of Puerto Rico, Rio Piedras
- University of Texas at El Paso
- University of Texas-Pan American

All CAHSI/SACNAS annual meeting attendees were invited to complete the annual meeting survey. Thirteen students responded. Over three-quarters of student
survey respondents were men (10 men, 3 women). All survey respondents were relatively advanced in their degree programs: 2 students (15%) identified as juniors, 6 students were seniors (46%), 3 (23%) were master’s students and 2 students (15%) were PhD candidates. Many annual meeting attendees were first-generation college students: six students also reported that their mother or maternal figure had not completed college while 8 students reported that their father or paternal figure had not completed college.

The majority of attendees identified themselves as Hispanic or Hispanic and another ethnicity: 69% of student survey respondents identified themselves as Hispanic. Three students identified as African-American, one identified as Caucasian and one identified as Native American. The majority of student attendees were from Computer Science departments (62%), with 23% from Computer Engineering, and 15% from Electrical Engineering and 7% from Mathematics.

Peer Leader Survey
A survey assessing peer leaders’ gains in skills, confidence, and career aspirations was distributed to all peer leaders in Spring 2014. The majority of respondents, 22 students, were from University of Houston, Downtown. Five students from University of Texas El Paso completed the survey, three students from Texas A&M Corpus Christi, two students from Northeastern Illinois University, and one student from Miami Dade College. Most students had minimal experience as peer leaders: 23% had served for one semester and 40% had served for two semesters; 37% of students had served for three or four semesters. Students were diverse racially and ethnically: 60% were Hispanic/Latino/a, 20% were Caucasian/White, 13% were Asian/Asian American, and 7% were African American/Black. Most of the survey respondents were male (59%) though a substantial minority were female (41%). Freshman students made up 23% of survey respondents, sophomores 27%, juniors 7%, and seniors 43%. Thirty-three students completed the survey, a sample too small to yield significant differences between groups.

CRA Data Buddies Survey
The Computing Research Association distributed the Data Buddies to all participating departments in fall of 2013. BPC-Alliances were encouraged to participate in the survey. CRA shared data with CAHSI evaluators so that the findings could be used for evaluative purposes. CAHSI undergraduates and graduates participated in the survey.

Overall, 225 CAHSI undergraduates completed the Data Buddies survey. These undergraduates represented a range of CAHSI departments: 13% were from UTEP,
45% from MDC, 22% from FIU, 7% from UPRM, 5% from TAMU-CC, 5% from CSU-DH, and 3% from NMSU. CAHSI undergraduates were ethnically diverse: 54% identified as Hispanic, 27% were Caucasian/White, 17% were Asian, 2% were American Indian or Native Hawaiian/Alaskan, and 5% were African-American/Black. In addition, 23% of undergraduate survey respondents were female. CAHSI undergraduates were also at various stages of their degree program: 25% were first year students, 24% were second year students, 22% were third year students, 13% were fourth year students, 6% were fifth year students or beyond, 4% had already graduated, and 7% marked “other.”

Additionally, 51 CAHSI graduate students completed the Data Buddies survey. Graduate students also spanned CAHSI departments: 33% were from NMSU, 2% from UPRM, 29% from FIU, 16% from TAMU-CC, 12% from UTEP, and 8% from CSU-DH. Eighteen percent of Data Buddies survey respondents were female. CAHSI graduate students were ethnically diverse: 37% identified as Caucasian/White, 4% were African-American/Black, 31% were Asian, and 33% were Hispanic.