

Recent Changes in Enrollment in CAHSI Departments

Heather Thiry and Sarah Hug
University of Colorado
Heather.thiry{sarah.hug}@colorado.edu

Introduction

CAHSI departments have experienced CS enrollment growth rates that range from modest to large. Five departments reported high growth rates, ranging from 10-25% per year in recent year, two departments have experienced a “modest increase” and one university has experienced a decline in growth. This decline was in a computer engineering department, rather than computer science, and the decline was attributed to the fact that the university had added two new majors in computing and some students are now choosing one of those majors over the traditional computer engineering degree. In spring 2016, CAHSI evaluators convened a focus group with CAHSI PIs to collect data on the challenges and opportunities faced by CAHSI departments in a time of high enrollment growth in computer science departments nationally.

Causes of recent enrollment growth

CAHSI faculty outlined the following factors as spurring the recent growth in CS enrollment, including adding new programs and an increase in minors taking CS courses. CAHSI faculty noted multiple contributing factors to increased undergraduate enrollment, including adding new programs or majors in computing fields, such as the Computer Technology degree program at CSU-DH. Other departments, such as NMSU, have seen an increase in students seeking a minor in Computer Science. These students come from both STEM and non-STEM fields, including social science and the arts. Another contributing factor is an increase in students seeking master’s degrees and potentially dual enrolling in upper-level undergraduate courses, as well as students seeking postbaccalaureate degrees, as evidenced by UTEP and TAMU-CC. Some departments in large urban areas have enrolled students at higher rates because other departments in the area cannot accommodate growth and these departments, such as CSU-DH, pick up the overflow of students.

Some populations of students are enrolling in CAHSI departments at higher rates, also accounting for enrollment growth. International undergraduate students, and non-Hispanic underrepresented minority students, such as African-Americans are enrolling in CAHSI courses at higher rates. The number of white students in CAHSI departments has remained steady. The growth in these populations is evidence in enrollment data collected from institutional research offices and from the observations of CAHSI PIs. Some campuses, such as TAMU-CC and CSU-DH have seen a decline in community college transfer students and an increase in traditional-age college students enrolling in degree programs straight from high school. Other campuses with strong relationships with local community colleges and articulation agreements to facilitate transfer, such as UTEP and UPRM, have seen increases in the number of transfer students from community colleges. Student pathways through college are changing as some more students may transfer from a community college to a 4-year institution, but continue to take some credits at the community college because tuition is less expensive, as has been the case with some UTEP students.

Challenges of CS enrollment growth

As more undergraduates enroll in CAHSI degree programs and courses, departments and faculty have faced several challenges. Departments have struggled with a lack of introductory courses/sections and may find themselves unable to accommodate such rapid growth. Almost all CAHSI PIs agreed that there are not enough faculty to teach key courses and they are unable to secure new faculty lines in their departments, jeopardizing their ability to manage enrollment growth. As undergraduate enrollment impinges on faculty time, they are less able to advise and mentor graduate students. Faculty also have less time to develop curriculum and carry out other essential duties, as noted by four PIs.

Departments are not the only sites that may face pressure from increasing enrollments; indeed, institutions may also face unique pressures from increasing computer science or computer engineering enrollments. For instance, campus revenues are declining, particularly with recent decreases in state support, and resources are scarce. Increasing enrollments in a few departments may place an undue burden on institutional resources. Institutional budget cycles and decision-making also move too slowly to adapt to increasing enrollments as quickly as is needed, creating a weak link between enrollment and resources. Administrators and others with financial authority may also be doubtful that increasing enrollments will be sustained, making them less likely to grant extra resources to single departments. For instance, UTEP may only be able to fill two out of six needed faculty positions because they do not have the lines for the other four positions. Finally, computer science and computer engineering degrees have high credit loads which may conflict with recent institutional and national initiatives to decrease time-to-degree.

As undergraduate enrollments increase, the expanded population of students may include students with less preparation that may affect retention rates. Several PIs mentioned that preparation was an issue for some students as they are not ready for college-level coursework and may be at risk of leaving the institution entirely. At least four PIs noted that increased enrollments have actually negatively affected retention rates as students are less prepared for computing coursework, less informed about the computer science degree, and may struggle to pass introductory courses, even with the supports offered in CAHSI courses. Students may not understand the degree requirements within the major or what it means to be a computer scientist. Lack of information coupled with lack of preparation can create issues with student retention, particularly in sophomore-level courses. For instance, CSU-DH has observed that students leave the major, or even the CS minor, after they learn about the Calculus and math requirements. An increase in commuter students can also raise challenges in offering appropriate student support because commuter students generally spend limited time on campus. Increased enrollments also contribute to larger class sizes and a lack of teaching assistants which will affect the quality of teaching, student learning, and student retention. Finally, five PIs noted that it may be harder to get resources to address increased enrollments at Hispanic-Serving institutions.

Strategies to address enrollment growth

CAHSI departments have implemented multiple strategies to address the challenges inherent in increased undergraduate enrollment. CAHSI departments have increased the number of sections in introductory courses, especially CS1, CS2, and Data Structures. Three departments have also increased the number of students in lecture sections of introductory courses while keeping lab sizes consistent. All PIs discussed strategies for providing enough instructors to teach the increased number of sections of introductory CS courses, including hiring part-time adjunct instructors, requesting more faculty lines, adding visiting faculty, and adding teaching faculty. Staffing has also created challenges for CAHSI departments in

terms of finding enough teaching assistants (TAs) to accommodate introductory sections. Some departments, such as UTEP, have added undergraduate TAs in addition to the typical graduate student TAs. Other departments have added more graduate teaching assistants or re-directed TAs from upper-division to lower-division courses.

Student retention is another significant challenge which CAHSI departments have faced. Departments have used multiple strategies to address student retention issues. Several departments have changed their placement or advising practices. For instance, NMSU has begun to use a placement exam to determine the most appropriate introductory course in which to place students. Two other departments, TAMU-CC and CSU-DH are considering adopting a placement exam for introductory courses, yet noted that this change can be costly and difficult. Other departments, such as UTEP, have adapted their advising strategies to monitor student progress to ensure that they have completed required courses in a timely manner and sequence. While UTEP has always provided these advising services, increased enrollment creates extra challenges in advising students. Another strategy to improve student retention is to create new programs so that students can move between programs as meets their needs and interests. Some programs may be more theoretical, while others are more applied. Some programs may be more math-oriented, while others have less of a focus on math. Some programs may also be interdisciplinary or work with other departments on campus. For instance, a new program at UPRM works closely with the business school on entrepreneurship. The Computer Technology degree at CSU-DH has also been highly successful allowing students to stay in a computing-oriented major without the full span of requirements of a traditional computer science degree. NMSU has also added a B.A. in C.S. with fewer math requirements. Several universities, including UTEP and NMSU, have also implemented core university courses in computational thinking that serve as general education requirements for non-majors. Finally, some institutions, such as UTEP and CSU-DH, are using institutional data to examine student pathways through the major and to identify trouble spots. For instance, CSU-DH discovered that students who received Bs or above in CS1 and CS2 had a 75% chance of receiving a degree in Computer Science, while students with Cs in those two courses had a 50% chance of receiving their degree. This type of intensive institutional data analysis can foster actionable findings that are tailored to specific CAHSI sites.

Opportunities generated by enrollment growth

Faculty noted far fewer opportunities compared to challenges in relation to enrollment growth, although CAHSI PIs mentioned several opportunities. For example, there is the opportunity to increase graduation rates with increased student enrollments. Additionally, as CAHSI departments have worked to create more pathways through the major, there is the possibility of receiving more community college transfer students. More course sections may also benefit CAHSI students as it will allow for more flexibility in scheduling for students who hold off-campus jobs or have families or other commitments. CAHSI PIs also noted that they had supportive deans or administrators within their university, including UTEP, NMSU, CSU-DH and UPRM. The increased student enrollment in computer science courses also offers the opportunity to better position and highlight the department within the university and to bring national attention to the field of computer science. In conclusion, CAHSI PIs hope that enrollment growth will eventually translate into more resources and support for faculty and the department as a whole.

Enrollment growth and Hispanics in computing

Enrollment growth offers the opportunity to increase the number of Hispanics in computing because of the large Hispanic student enrollment at HSIs. If course enrollments are increasing, CAHSI faculty will need to reconsider their classroom practices to reflect larger course enrollments. Effective teaching practices may need to change with larger enrollments. There is an increased need for more alliances and consortia to share best practices in computing for serving underrepresented students; specifically how to adopt practices and measure their success. Finally, growth must reflect the needs of diverse students. Departments must be aware of the culture created by increased enrollment, there is the possibility that increased growth could lead to a more competitive departmental climate. Students will continue to need support systems because there is the danger that more students may leave the major if appropriate support systems are not in place.