ACM-NDC Study 2020-2021:

Ninth Annual Study of Non-Doctoral-Granting Departments in Computing

By Stuart H. Zweben, *The Ohio State University*,
Jodi L. Tims, *Northeastern University*,
Cindy Tucker, *Bluegrass Community and Technical College*, and
Yan Timanovsky, *Association for Computing Machinery*

The annual ACM NDC Study provides timely information about the state of academic computing in non-doctoral-granting departments of computing in the United States. The data are useful to the computing community, academic administrators, and the media. This study reports student enrollment and degree completion data for the 2019-2020 academic year across six computing disciplines at the bachelor's level and, for the first time, three computing disciplines at the associate's level. The student data are disaggregated by gender, race/ethnicity, and class rank. The study also reports faculty demographic and salary data from non-doctoral-granting departments that offer bachelor's computing programs.

INTRODUCTION

Since 2011, ACM has conducted an annual study of enrollment, graduation, and faculty in Non-Doctoral-Granting Departments of Computing (NDC) in the United States. This ACM NDC Study complements the annual Taulbee Survey of doctoral-granting programs performed by the Computing Research Association (CRA) [9]. Together, the two surveys afford the computing community a comprehensive look at the status of key elements of computing programs of study within academia. Of particular interest to the NDC Study are the data about bachelor's programs in each of the computing disciplines in which ACM provides curricular guidelines [2] and in which ABET program accreditation criteria exist [1]. Prior to 2018, there were five such areas: computer science (CS), computer engineering (CE), information systems (IS), information technology (IT), and software engineering (SE). In 2018, ACM approved curricular guidelines in the area of cybersecurity (CY) and ABET accredited its first programs in this area.

This year, for the first time, we are incorporating associate's programs into our student data reporting. The associate's data includes three computing disciplines: CS, IT, and CY. ACM's Committee for Computing Education in Community Colleges (CCECC) has published guidelines for associate's programs in each of these disciplines, and ABET now accredits 2-year programs in CY within its Computing Accreditation Commission.

Comparable data about associate's level programs also are of interest to the computing community, as these programs provide another important source of employment into the computing workforce, as well as a source of students for bachelor's programs. This year, for the first time, we are incorporating associate's programs into our student data reporting. The associate's data includes three computing disciplines: CS, IT, and CY. ACM's Committee for Computing Education in Community Colleges (CCECC) has published guidelines for associate's programs in each of these disciplines, and ABET now accredits 2-year programs in CY within its Computing Accreditation Commission.

With support from the ACM Education Board, we obtained enrollment and graduation statistics for the bachelor's and associate's programs from the National Student Clearinghouse Research Center (NSC), a non-profit organization to which nearly all academic institutions in the United States provide data annually [7]. The data provided to NSC typically are reported by an institution-level data office rather than an academic department-level office. Data are reported at the individual student level and include the student's current program of study, using the Classification of Instructional Program (CIP) Code [5]. Faculty data for this year's study were obtained only from U.S. NDC institutions with bachelor's programs in at least one of the six computing disciplines. The faculty data were obtained through a survey of departments[1] that grant such bachelor's degrees. We are evaluating the feasibility of providing faculty data for associate's programs in future years.

The student data include enrollment and graduation data reported to NSC from all U.S. institutions reporting associate's level data, and from those institutions reporting bachelor's data that are not classified as either Doctoral Very-High Research (aka R1) or Doctoral High Research (aka R2) institutions [3]. These "non-R1 or R2" institutions do not provide data to the CRA Taulbee Survey; therefore, there should be no overlap of the data in this report with that in the Taulbee Survey. There also are several R2 institutions that do not grant doctoral degrees in computing and therefore do not report to the Taulbee Survey. However, the level of granularity of the data obtained from the NSC did not allow us to further break down the R2 institutions into those that grant computing doctoral degrees and those that do not. From past experience, we estimate that about one-third to one-half of the R2 institutions grant doctoral degrees in computing. The CRA Taulbee Survey provides good coverage of the doctoral programs from both R1 and appropriate R2 institutions.

To obtain the student data from NSC, each computing discipline was assigned CIP Codes according to the mapping in Table 1. This mapping is the same as was used in last year's NDC Study, and was recommended by persons involved in ACM curriculum and/or accreditation activities.

Table 1: Mapping of Cip Codes to Computing Disciplines

DISCIPLINE	CIP CODES
CE	14.0901, 14.0902
CS	11.0101, 11.0701
CY	11.1003, 43.0116
IS	11.0401, 11.0501, 52.1201, 52.1206, 52.1299
IT	11.0103, 11.0201, 11.0202, 11.0301, 11.0801, 11.0802, 110804, 11.0899, 11.0901, 11.1001, 11.1002, 11.1004, 11.1005
SE	14.0903

[1] In keeping with the NDC acronym, we use the term "department" to refer to refer to any of the academic units surveyed, regardless of their actual title. Most, in fact, have this title.

In the remainder of this report, we provide the NSC bachelor's enrollment and graduation data from non-R1 or R2 institutions, and the comparable associate's data from all institutions, for the 2019-2020 academic year. We offer comparisons of the results with NSC data from the two preceding years. The bachelor's comparisons use the data reported in last year's NDC Study [8]. The associate's comparisons use additional data we obtained from NSC for this purpose. Following the presentation of the enrollment and graduation results, we report the faculty results obtained from the much smaller set of bachelor's granting departments who responded to this year's survey. These faculty data cover the 2020-2021, academic year, and will be compared with the data obtained last year.

ENROLLMENT AND GRADUATION RESULTS

Table 2 shows, overall and by institution type, the actual representation of each discipline among the set of institutions that provided 2019-20 enrollment and graduation data. The table includes breakdowns by institutional control into public, private not-for-profit, and for-profit. It also includes a column for Minority Serving Institutions (MSI). Except for IS, which had a 1.7% reduction, all bachelor's areas experienced some growth compared with last year in the number of institutions reporting. The IT and CY areas experienced the largest growth at 9.2% and 30.3%, respectively. The associate's disciplines were mixed; the number of institutions providing NSC associate's data for CS declined by 4.7% compared with 2018-19, was almost identical for IT (-0.2% difference), and increased by 20.5% in CY. The rows labeled "Bachelor's Totals" and "Associate's Totals" are the sum of the values in the individual discipline rows. They do not actually represent the total number of institutions. However, since each institution reporting values in a given discipline has at least one program in that discipline, the Totals rows give a lower bound on the number of programs for which we received data.

Table 2: Number of Institutions Providing 2019-2020 NSC Student Data, by Institution Type and Discipline

BACHELOR'S	Overall	Public	Private not-for-profit	Private for-profit	MSI
CS	705	262	435	8	139
CE	87	39	47	1	24
IS	297	149	138	10	55
IT	250	114	116	20	48
SE	39	20	17	2	4
CY	116	39	66	11	16
Bachelor's Totals	**1,494**	**623**	**819**	**52**	**286**
ASSOCIATE'S					
CS	384	367	14	3	140
IT	654	614	27	13	185
CY	212	204	8	0	58
Associate's Totals	**1,250**	**1,185**	**49**	**16**	**383**

The student enrollment and graduation data are disaggregated within each discipline by gender, race/ethnicity, and, for bachelor's programs, class rank. The next subsection presents the data analysis for bachelor's students and the following subsection does likewise for associate's students.

BACHELOR'S PROGRAMS

The number and percentage change of degrees granted in each program area are presented in Table 3. Across all disciplines, there was a 7.2% increase in total degree production, and a 3.3% increase when normalized for the reporting institutions in each discipline. Cybersecurity had the greatest percent change in total degrees (28.2%) and number of institutions with bachelor's programs (27), while computer science had the greatest change (7.0%) in degrees per institution reporting. Information systems was the only discipline that experienced a decrease in number of institutions (-5) and in total degrees (-0.2%), while information technology and cybersecurity were the only disciplines that experienced a decrease in the degrees per institution reporting (-4.4% and -1.5%, respectively).

Table 4 presents the gender representation in degrees awarded broken out by discipline for 2019-2020. Compared with 2018-2019, there were increases in the percentage of overall graduates who were female (20.7% in 2019-2020 vs 19.9% in 2018-2019). All disciplines except information systems showed an increase in the percentage of graduates who were female, and information systems was nearly the same (24.4% in 2019-2020 vs 24.5% in 2018-2019). Compared with 2019-2020 graduates from bachelor's CS programs at doctoral-granting departments as reported to the CRA Taulbee Survey [9], the CS programs reporting from NDC institutions had somewhat less diversity among their graduates (19.7% female for NDC CS institutions vs 20.6% from Taulbee CS institutions). However, the 0.9% gap is much less than the 2.7% gap reported for 2018-2019 [8].

The breakdown of degrees awarded by race/ethnicity for 2019-20 is presented in Table 5. Some of the cells have a value of "NA" because the totals could not be computed from the data that was provided. This happens when the cells involved in the computations have small values; NSC does not report exact values for cells having values less than 10.

In comparison to programs from Taulbee CS institutions and consistent with prior NDC Study reports, a higher percentage of CS degrees is awarded to Black/African-Americans, Hispanic/Latino, and White students. Among students whose residency is known, the percentage of CS degrees awarded to U.S. residents who are non-White and non-Asian is 25.0% institutions (14,029-443-2,166-7,911)/14,029 for the NDC institutions, compared with 15.3% for the Taulbee CS institutions. Over all six NDC disciplines, the percentage cannot be computed precisely from the table since the non-resident total is not known exactly, but the percentage is between 28% and 29% based on the entries that are present.

Enrollment change from 2018-2019 to 2019-2020 is shown in Table 6. In aggregate across all disciplines, there was a 5.5% increase in total enrollment and a 1.5% increase when enrollment

Table 3: Bachelor's Degree Production Change by Discipline

	2019-2020 N Inst	2019-2020 Degrees	2019-2020 Degrees per Inst	2018-2019 N Inst	2018-2019 Degrees	2018-2019 Degrees per Inst	% Change Degrees	% Change Degrees per Inst
NDC Overall	1,494	37,516	25.1	1,438	35,000	24.3	3.3%	3.3%
CS	705	17,284	24.5	696	15,924	22.9	7.0%	7.0%
CE	87	1,454	16.7	85	1,332	15.7	6.4%	6.4%
IS	297	6,869	23.1	302	6,886	22.8	1.3%	1.3%
IT	250	8,317	33.3	229	7,970	34.8	-4.3%	-4.4%
SE	39	604	15.5	37	558	15.1	2.6%	2.6%
CY	116	2,988	25.8	89	2,330	26.2	-1.5%	-1.5%

Table 4: Bachelor's Degrees Awarded by Gender and Discipline (2019-2020)

	Male		Female		Total Known Gender	Gender Unreported or Other	Grand Total
CS	13,266	80.3%	3,258	19.7%	16,524	760	17,284
CE	1,164	85.7%	195	14.3%	1,359	95	1,454
IS	5,013	75.6%	1,622	24.4%	6,635	234	6,869
IT	6,208	77.9%	1,765	22.1%	7,973	344	8,317
SE	470	84.7%	85	15.3%	555	49	604
CY	2,426	82.1%	530	17.9%	2,956	32	2,988
NDC Overall	28,547	79.3%	7,455	20.7%	36,002	1,514	37,516
Taulbee CS	23,390	79.4%	6,065	20.6%	29,455	2,380	31,835

Percentages are relative to those for whom gender is known

Table 5: Bachelor's Degrees Awarded by Race/Ethnicity and Discipline (2019-2020)

	US Residents							Others			Total
	Hispanic/ Latino	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Black/ African-American	White	2 or More Races, Non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	Residency/ Race Unknown	
NDC Overall	3,644	NA	3,898	NA	2,933	15,794	NA	NA	28,555	8,961	37,516
	12.8%		13.7%		10.3%	55.3%					
CS	1,790	68	2,166	43	1,028	7,911	580	443	14,029	3,255	17,284
	12.8%	0.5%	15.4%	0.3%	7.3%	56.4%	4.1%	3.2%			
CE	249	NA	281	NA	59	584	48	35	1,264	190	1,454
	19.7%		22.2%		4.7%	46.2%	3.8%	2.8%			
IS	561	32	532	20	832	2,833	270	88	5,168	1,701	6,869
	10.9%	0.6%	10.3%	0.4%	16.1%	54.8%	5.2%	0.4%			
IT	779	43	686	19	729	2,912	212	142	5,522	2,795	8,317
	14.1%	0.8%	12.4%	0.3%	13.2%	52.7%	3.8%	2.6%			
SE	60	NA	91	NA	22	271	NA	NA	482	122	604
	12.4%		18.9%		4.6%	56.2%					
CY	205	NA	142	NA	263	1,283	92	NA	2,090	898	2,988
	9.8%		6.8%		12.6%	61.4%	4.4%				
Taulbee CS	2,290	46	7,786	28	843	11,023	936	4,107	27,059	4,776	31,835
	8.5%	0.2%	28.8%	0.1%	3.1%	40.7%	3.50%	15.2%			

was normalized for number of institutions. SE and CS led the way with overall respective enrollment increases of 22.0% and 6.0%, and respective increases of 15.8% and 4.6% when normalized for number of institutions. CY had a 21.5% increase in total enrollment, but when normalized for number of institutions there actually was a 6.8% decline. However, the increase is indicative to the growth in cybersecurity programs, which also was observed in last year's report. The IT discipline also had an increase in total enrollment and a decline in normalized enrollment, while CE and IS had declines in both total and normalized enrollment.

Table 7 shows the enrollment by gender and discipline in 2019-20, and Figure 1 shows, for each discipline and overall, the three-year trend in the percentage of enrolled students who are female. The IS and IT disciplines continue to have the highest gender diversity, while CE has the lowest. Over the past three years, gender diversity has improved overall in the NDC computing programs, and within the CS, IS, IT, and SE disciplines. The CS gender diversity at NDC institutions continues to lag that in institutions that have doctoral CS programs.

Table 6: Bachelor's Enrollment Changes by Discipline

	2019-2020 N Inst	2019-2020 Enrollment	2019-2020 Enrollment per Inst	2018-2019 N Inst"	2018-2019 Enrollment	2018-2019 Enrollment per Inst	% Change in Enrollment	% Change in Enrollment per Inst
NDC Overall	1,494	318,491	213.2	1,438	302,000	210.0	5.5%	1.5%
CS	705	136,643	193.8	696	128,907	185.2	6.0%	4.6%
CE	87	11,341	130.4	85	11,449	134.7	-0.9%	-3.2%
IS	297	48,065	161.8	302	51,532	170.6	-6.7%	-5.2%
IT	250	81,951	327.8	229	76,811	335.4	6.7%	-2.3%
SE	39	4,805	123.2	37	3,938	106.4	22.0%	15.8%
CY	116	35,686	307.6	89	29,363	329.9	21.5%	-6.8%

Table 7: Bachelor's Enrollment by Gender and Discipline (2019-2020)

	Male		Female		Total Known Gender	Gender Unreported or Other	Grand Total
CS	105,268	80.5%	25,447	19.5%	130,715	5,928	136,643
CE	9,219	86.6%	1,429	13.4%	10,648	693	11,341
IS	34,816	74.8%	11,738	25.2%	46,554	1,511	48,065
IT	59,805	75.6%	19,278	24.4%	79,083	2,868	81,951
SE	3,772	82.7%	788	17.3%	4,560	245	4,805
CY	28,896	81.7%	6,485	18.3%	35,381	305	35,686
NDC Overall	241,776	78.8%	65,165	21.2%	306,941	11,550	318,491
Taulbee CS	106,104	79.1%	28,003	20.9%	134,107	9,564	143,671

Percentages are relative to those for whom gender is known

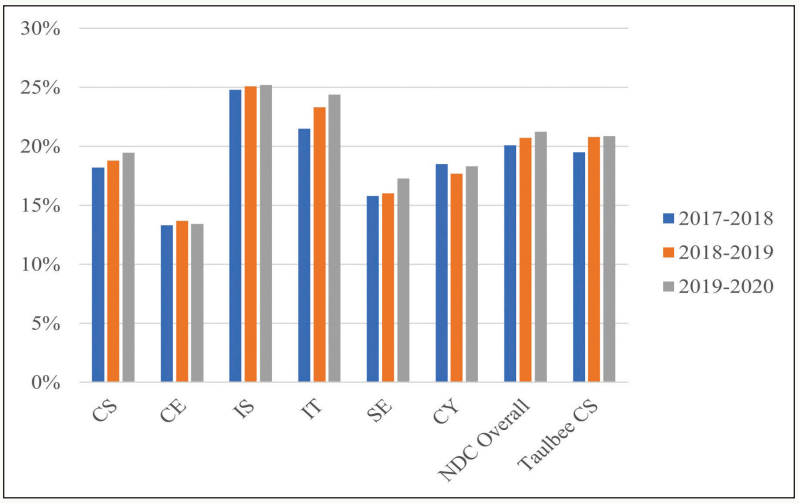

Figure 1: Bachelor's Female Enrollment by Discipline: 2017-2018 through 2019-2020

Table 8 breaks down the 2019-2020 enrollment by ethnicity for each discipline. As was the case for gender diversity, the IS and IT disciplines have the greatest diversity with respect to race/ethnicity. SE is the least diverse. Figure 2 illustrates this further, and shows the three-year trend for each discipline with respect to representation of students who are not Asian, White or Non-resident Alien. The diversity for each discipline improved in 2019-2020 relative to 2018-2019, and diversity in all disciplines except SE improved each year during this period. It is also worth noting that the diversity in CS is considerably greater for the NDC institutions than it is for the doctoral-granting institutions that report to the CRA Taulbee Survey. On the other hand, the Taulbee institutions have a considerably larger fraction of bachelor's students who are Non-resident Aliens. The NDC institutions also identify the race/ethnicity of a smaller fraction (68.5%) of their enrolled students than do the Taulbee institutions (81.8%

Enrollment by class rank by discipline is depicted in Table 9. For every discipline except IS, there are fewer students enrolled in the sophomore class than there are in the freshman class. Factors influencing this include the changing size of the freshman class, changing interest in the discipline among new students, and attrition among students in the program during the first year. Across the six disciplines, total freshman enrollment was 10% higher in 2019-2020 than in 2018-2019. However, in CE, it was 8.5% lower and in IS it was 10.2% lower. As we saw earlier, total enrollment in CE and IS declined between 2018-2019 and 2019-2020, while enrollment in the other four disciplines rose.

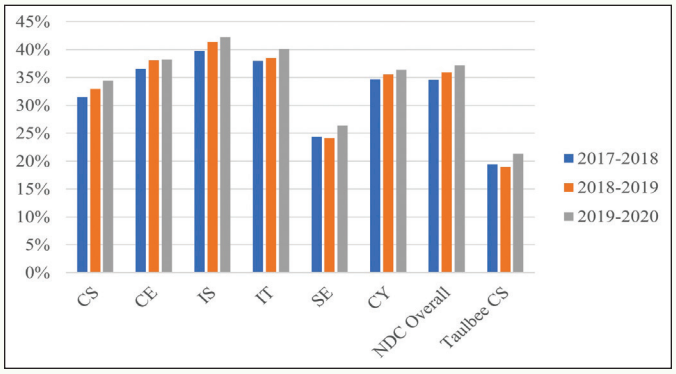

Figure 2: Representation of Bachelor's Students Other than Asian, White, or Non-resident Alien, by Discipline: 2017-2018 through 2019-2020

Also note that there is a fairly sizeable number of students whose class rank was not reported. This makes the class rank data less representative of the true population.

ASSOCIATE'S PROGRAMS

This ninth ACM NDC Study presents inaugural associate's data for three computing disciplines: CS, IT, and CY. These data are meaningful to community colleges, associate's degree programs at four-year institutions, and institutions that receive transfer students from two-year programs. To assist comparison, tables and figures for bachelor's and associate's programs are similarly constructed,

The number and percentage change from 2018-2019 to 2019-2020 of degrees granted for associate's programs in CS, IT, and CY are presented in Table 10. Across the three disciplines, there

Table 8: Bachelor's Enrollment by Race/Ethnicity and Discipline (2019-2020)

	US Residents							Others			
	Hispanic/ Latino	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Black/ African-American	White	2 or More Races, Non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	Residency/ Race Unknown	Total
NDC Overall	34,253	NA	23,065	NA	33,715	109,769	10,705	4,294	218,278	100,213	318,491
	15.7%		10.6%		15.4%	50.3%	4.9%	2.0%			
CS	16,741	542	12,291	355	12,267	51,255	4,639	2,255	100,345	36,298	136,643
	16.7%	0.5%	12.2%	0.4%	12.2%	51.1%	4.6%	2.2%			
CE	2,420	52	1,796	43	620	3,555	328	251	9,065	2,276	11,341
	26.7%	0.6%	19.8%	0.5%	6.8%	39.2%	3.6%	2.8%			
IS	4,692	276	3,098	164	7,492	17,233	2,461	319	35,735	12,330	48,065
	13.1%	0.8%	8.7%	0.5%	21.0%	48.2%	6.9%	0.9%			
IT	7,369	522	4,363	240	9,414	23,954	2,021	890	48,773	33,178	81,951
	15.1%	1.1%	8.9%	0.5%	19.3%	49.1%	4.1%	1.8%			
SE	478	NA	521	NA	326	2,128	132	95	3,729	1,076	4,805
	12.8%		14.0%		8.7%	57.1%	3.5%	2.5%			
CY	2,553	NA	996	NA	3,596	11,644	1,124	484	20,631	15,055	35,686
	12.4%		4.8%		17.4%	56.4%	5.4%	2.3%			
Taulbee CS	14,526	256	30,675	112	5,862	46,413	4,279	15,405	117,528	26,143	143,671
	12.4%	0.2%	26.1%	0.1%	5.0%	39.5%	3.6%	13.1%			

Percentages are relative to those for whom residency is known

Table 9: Bachelor's Enrollment by Class Rank

	2019-2020										
	Freshman		Sophomore		Junior		Senior		Total Known Rank	Unreported Rank	Total
	Enrollment	% of Known Total	Enrollment	% of Known Total	Enrollment	% of Known Total	Enrollment	% of Known Total			
CS	25,835	24.6%	21,498	20.5%	25,039	23.8%	32,726	31.1%	105,098	31,545	136,643
CE	2,225	23.5%	1,983	20.9%	1,933	20.4%	3,336	35.2%	9,477	1,864	11,341
IS	5,320	14.8%	6,230	17.4%	11,157	31.1%	13,155	36.7%	35,862	12,203	48,065
IT	11,547	26.9%	8,139	18.9%	9,838	22.9%	13,443	31.3%	42,967	38,984	81,951
SE	982	26.0%	750	19.9%	822	21.8%	1,221	32.3%	3,775	1,030	4,805
CY	5,701	27.1%	4,636	22.0%	4,839	23.0%	5,862	27.9%	21,038	14,648	35,686
NDC Overall	51,610	23.7%	43,236	19.8%	53,628	24.6%	69,743	32.0%	218,217	100,274	318,491

Percentages are relative to those for whom class rank is known

was a decrease in total degree production (-2.2%) and a decrease when normalized for the reporting institutions in each discipline (-3.4%). CY alone had an increase in degree production (12.6%) while CS and IT experienced a decrease in degree production (-2.9% and -4.1% respectively). CY was the only discipline with an increase in the number of institutions (20.5%) and the number of degrees granted (12.6%). It is interesting to note while CY had growth, the number of degrees per institution decreased (-6.5%). This may be related to new CY programs ramping up and the anticipated number of graduates not yet realized. CS was the only discipline with an increase in degrees per institution while it had a decrease in the number of degrees (-2.9%) and a decrease in the number of institutions (-4.7%).

Table 11 presents 2019-20 associate's degrees awarded by gender and discipline. Referring to similar 2018-19 associate's data that we obtained from NSC, there is an overall increase in the percentage of degrees awarded to female students (21.4% in 2019-20 vs 20.4% in 2018-19). Likewise, there is an increase in the percentage of degrees awarded to female students in IT (22.8% in 2019-20 vs 21.0% in 2018-19) and CY (21.4% in 2019-20 vs 18.1% in 2018-19) and a slight decrease in computer science (19.7% in 2019-20 vs 20.0% in 2018-19). The percentage of degrees awarded to females in CY is higher for associate's degrees (19.5%) than bachelor's degrees (17.9%) while the gender diversity in CS and IT are similar for bachelor's and associate's degrees.

Table 12 illustrates the summary of associate's degrees awarded by race/ethnicity. When compared to 2018-2019, there was an increase in degree production across all disciplines for Hispanic/Latino students (1.0% overall, 2.1% in CS, 0.8% in IT, and 1.1% in CY). There was an increase in degrees granted to Black/African American students overall (0.6%), CS (0.2%), and IT (1.1%) and a very slight decrease in CY (-0.1%). CS had the largest increase in degree production across all disciplines and race/ethnicity categories for Hispanic/Latino students (2.1%) and CS and IT shared the largest decrease across all categories for white students (-2.6%).

Enrollment change for associate's programs from 2018-2019 to 2019-2020 is presented in Table 13. All disciplines, excluding cybersecurity, experienced a decrease in enrollment. In aggregate, there was a 1.0% decrease in associate's computing programs; CS had a 1.3% decrease, and IT had a 3.5% decrease. CY, however, had a 16.7% increase in enrollment, reflective of the considerable increase in the number of institutions offering such

Table 10: Associate's Degree Production Change by Discipline

	2019-2020 N Inst	2019-2020 Degrees	2019-2020 Degrees per Inst	2018-2019 N Inst	2018-2019 Degrees	2018-2019 Degrees per Inst	% Change Degrees	% Change Degrees per Inst
NDC Overall	1,250	20,574	16.5	1,234	21,035	17.0	-2.2%	-3.4%
CS	384	6,672	17.4	403	6,868	17.0	-2.9%	2.0%
IT	654	11,755	18.0	655	12,261	18.7	-4.1%	-4.0%
CY	212	2,147	10.1	176	1,906	10.8	12.6%	-6.5%

Table 11: Associate's Degrees Awarded by Gender and Discipline (2019-2020)

	Male		Female		Total Known Gender	Gender Unreported or Other	Grand Total
NDC Overall	15,651	78.6%	4,272	21.4%	19,923	651	20,574
CS	5,165	80.3%	1,270	19.7%	6,435	237	6,672
IT	8,798	77.2%	2,593	22.8%	11,391	364	11,755
CY	1,688	80.5%	409	19.5%	2,097	50	2,147

Table 12: Associate's Degrees Awarded by Race/Ethnicity and Discipline (2019-2020)

	US Residents							Others			Total
	Hispanic/ Latino	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Black/ African-American	White	2 or More Races, Non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	Residency/ Race Unknown	
NDC Overall	2,714	122	1,760	57	2,101	8,808	666	262	16,490	4,084	20,574
	16.5%	0.7%	10.7%	0.3%	12.7%	53.4%	4.0%	1.6%			
CS	1,169	42	804	16	565	2,473	237	84	5,390	1,282	6,672
	21.7%	0.8%	14.9%	0.3%	10.5%	45.9%	4.4%	1.6%			
IT	1,334	66	796	34	1,240	5,339	348	163	9,320	2,435	11,755
	14.3%	0.7%	8.5%	0.4%	13.3%	57.3%	3.7%	1.7%			
CY	211	14	160	7	296	996	81	15	1,780	367	2,147
	11.9%	0.8%	9.0%	0.4%	16.6%	56.0%	4.6%	0.8%			

Table 13: Associate's Program Enrollment Changes by Discipline

	2019-2020 N Inst	2019-2020 Enrollment	2019-2020 Enrollment per Inst	2018-2019 N Inst	2018-2019 Enrollment	2018-2019 Enrollment per Inst	% Change in Enrollment	% Change in Enrollment per Inst
NDC Overall	1,250	262,996	210.4	1,234	265,525	215.2	-1.0%	-2.2%
CS	384	109,406	284.9	403	110,833	275.0	-1.3%	3.6%
IT	654	129,080	197.4	655	133,694	204.1	-3.5%	-3.3%
CY	212	24,510	115.6	176	20,998	119.3	16.7%	-3.1%

programs. While CS had a decrease in enrollment, it had an increase in normalized enrollment (3.6%). CY had an increase in enrollment but a decrease in normalized enrollment (-3.1%).

Annually, the American Association of Community Colleges (AACC) analyzes and publishes trends in community college enrollments and completion rates. They use data from the U.S. Department of Education and the National Student Clearinghouse (NSC). The NSC data compare fall enrollment from year to year. The July 2020 report [4] highlights trends from fall 2017 through fall 2019. It finds that overall enrollment in associate degree-seeking programs has decreased each of the last two years (-2.0% in fall 2018, and -2.8% in fall 2019). The 2.8% decrease in 2019 is greater than the aggregate 1.0% decrease that we observed for the three associate's degree computing disciplines.

It is interesting to compare other disciplines to computing disciplines. The AACC study reports the enrollment percent change between Fall 2018 and Fall 2019 by broad major area, using 2-digit CIP codes to define the broad area rather than the more fine-grained 6-digit codes used in this NDC Study. Almost all majors saw a decrease in enrollment. A few select broad areas are illustrated in Table 14, with their 2-digit CIP code in parenthesis. Most of the CIP codes for the three associate's disciplines that we studied are in the Computer and Information Sciences and Support Services area, although this area also includes codes outside of the three disciplines. The decrease of 5.8% shown in Table 14 is considerably greater than the 1.0% decrease that we observed.

Table 15 highlights 2019-2020 associate's program enrollment by gender across the three associate disciplines. Figure 3 illustrates a three-year trend for the percentage of enrolled females, using associate's program enrollment data we obtained from NSC for 2017-2018. CS had the poorest gender diversity

Table 14: American Association of Community Colleges Percent Change in Enrollment

Classification of Instruction Program (CIP)	% Change
Science Technology/Technicians (41)	16.0%
Psychology (42)	0.6%
Biological and Biomedical Sciences (26)	-3.2%
Mathematics and Statistics (27)	-5.3%
Computer and Information Sciences and Support Services (11)	-5.8%
Communications Technologies/Technicians and Support Services (10)	-4.3%
Engineering (14)	-8.2%
Engineering Technologies and Engineering-Related Fields (15)	-9.3%
Business, Management, Marketing, and Related Support (52)	-9.4%

at 19.6% while IT and CY were comparable with 22.3% and 22.1%, respectively. The percentage of females in all bachelor's programs was identical to the percentage of females in all associate's degree programs (21.2%). Across all disciplines for associate's programs, there has been an increase each year in the percentage of female students in computing programs. Bachelor's programs also saw an increase each year for CS, IS, IT, and SE.

Table 15: Associate's Program Enrollment by Gender and Discipline (2019-2020)

	Male		Female		Total Known Gender
NDC Overall	198,407	78.8%	53,248	21.2%	251,655
CS	83,664	80.4%	20,397	19.6%	104,061
IT	96,221	77.7%	27,601	22.3%	123,822
CY	18,522	77.9%	5,250	22.1%	23,772

Percentages are relative to those for whom gender is known

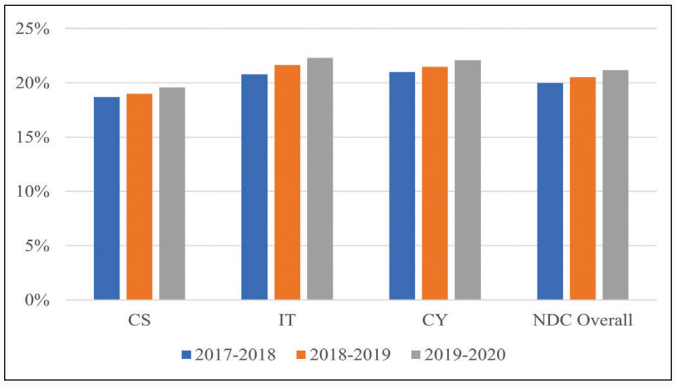

Figure 3: Associate's Female Enrollment by Discipline: 2017-2018 through 2019-2020

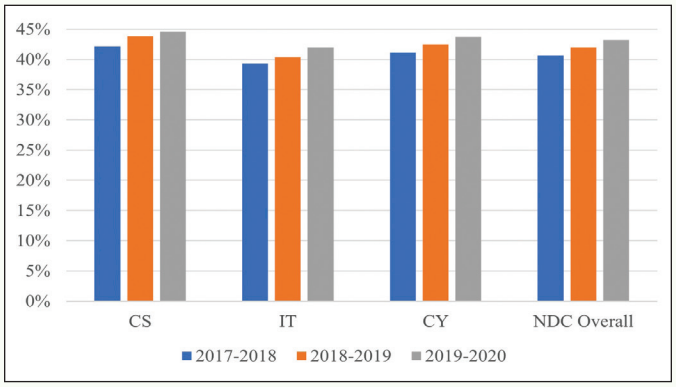

Figure 4: Representation of Associate's Students Other than Asian, White, or Non-Resident Alien, by Discipline: 2017-2018 through 2019-2020

Table 16 disaggregates the 2019-2020 associate's degree program enrollment by race/ethnicity for each computing discipline. The diversity for each discipline improved from 2018-2019 to 2019-2020 relative to Hispanic/Latino students. The percentage of Black/African American students decreased slightly for all disciplines (decrease ranging from -0.06% to -0.37%). Figure 4 highlights a three-year diversity trend for each discipline for students who are not Asian, White, or Non-resident Alien. This diversity increased for each discipline for each year. For bachelor's programs, for students who are not Asian, White, or Non-resident Alien, the diversity increased each year for all disciplines except software engineering.

FACULTY RESULTS

As noted in the introduction, we obtained data about faculty demographics and salaries from a survey of non-doctoral-granting departments that grant computing bachelor's degrees. Though normal department operations were significantly disrupted this year, we received responses from 120 departments. However, this was only about 80% of the number who responded last year. Departments from private institutions comprised just over 66.7% of the respondents, similar to last year. More than 75% of the respondents were from departments that do not grant master's degrees in computing; this is a greater fraction than last year's 66.7% (Table 17).

Slightly more than 75% of this year's respondents (93) also responded to last year's faculty survey. Since there is a reasonable fraction of departments that were not in last year's survey, the year-to-year comparisons of the demographic and salary data should be interpreted with this in mind.

The average faculty size this year is 13.7 in headcount, and 11.4 FTE, both somewhat lower than the respective 13.9 and 12.1 reported last year. The changes were mainly in lower average headcount and FTE for visiting faculty, and lower average FTE for part-time/adjunct faculty. However, the average headcount for part-time/adjunct faculty is the same as it was last year, and the average headcount and FTE for both tenure-track faculty and full-time non-tenure-track faculty are about the same as last year. Departments at public institutions continue to rely more heavily on tenure-track and full-time non-tenure-track faculty than did departments at private institutions, while private institutions have a greater fraction of part-time/adjunct faculty members. Also similar to past years, non-master's-granting departments have a greater percentage of their faculty as tenure-track and smaller percentages as full-time non-tenure-track and part-time/adjunct than do master's granting departments (Table 17).

Table 16: Associate's Program Enrollment by Race/Ethnicity and Discipline (2019-2020)

	US Residents							Others			
	Hispanic/ Latino	American Indian/ Alaska Native	Asian	Native Hawaiian/ Pacific Islander	Black/ African-American	White	2 or More Races, Non-Hispanic	Non-Resident	Total Ethnicity, Residency Known	Residency/ Race Unknown	Total
NDC Overall	**46,148**	1,556	25,786	820	31,788	90,503	10,187	2,607	209,395	53,601	262,996
	22.0%	0.7%	12.3%	0.4%	15.2%	43.2%	4.9%	1.2%			
CS	**22,350**	540	13,858	308	10,291	32,384	4,496	1,015	85,242	24,164	109,406
	26.2%	0.6%	16.3%	0.4%	12.1%	38.0%	5.3%	1.2%			
IT	**20,423**	866	10,250	440	17,157	48,423	4,637	1,404	103,600	25,480	129,080
	19.7%	0.8%	9.9%	0.4%	16.6%	46.7%	4.5%	1.4%			
CY	**3,375**	150	1,678	72	4,340	9,696	1,054	188	20,553	3,957	24,510
	16.4%	0.7%	8.2%	0.4%	21.1%	47.2%	5.1%	0.9%			

Percentages are reletive to those for whom residency is known

Table 17: Actual Faculty Size 2020-2021

Faculty Type	Overall Avg HC	Overall % of HC Total	Overall Avg FTE	Overall % of FTE Total	Public FTE	Private FTE	Non-Master's FTE	Master's FTE
# Respondents	120		120		39	81	88	32
Tenure-track	6.7	48.8%	6.6	58.0%	60.3%	56.4%	67.2%	50.6%
Visiting	0.2	1.7%	0.2	1.9%	1.6%	2.1%	2.9%	1.1%
FT Non-TT	1.4	10.1%	1.4	12.2%	16.8%	8.8%	8.0%	15.5%
PT/Adjunct	5.4	39.4%	3.2	27.9%	21.3%	32.7%	21.9%	32.8%
Total	**13.7**		**11.3**					

Within each category of institutions, and overall, there is a fairly even distribution of tenure-track faculty members at each of the three faculty ranks (Table 18). This also was observed last year.

Table 18: Tenure-track Faculty Average Headcount Breakdown by Rank 2020-2021

Faculty Type	Overall	Overall %	Public	Private	Non-Master's	Master's
# Respondents	112		36	76	82	30
Full Professor	2.2	33.4%	35.4%	31.9%	30.0%	37.1%
Associate Professor	2.2	32.6%	31.7%	33.3%	34.1%	31.0%
Assistant Professor	2.2	33.7%	32.3%	34.7%	35.9%	31.3%
Other	0	0.3%	0.6%	0.0%	0.0%	0.5%

Although the number of departments reporting this year was only about 80% of those reporting last year, this year the number of tenure-track faculty for whom we have demographic data (803) is 85% of last year's number. Gender diversity among the tenure-track faculty reported this year is higher than last year, with 28.0% female among those whose gender was reported. Last year's percentage was 24.5. Increased percentage of female faculty versus last year is present at all three ranks (Table 19). There is a higher percentage of Asian and lower percentage of White faculty reported this year compared with last year. Only 6.0% of the entire tenure-track faculty was Black, Hispanic, Native American, Native Hawaiian/Pacific Islander, or two or more races. This is similar to last year's 5.9%. The percentage increases to 6.3% if only those whose residency is known are considered, and to 6.5% if only faculty are considered if their residency and race/ethnicity are known (Table 20).

Table 19: Tenure-track Faculty Headcount Breakdown by Gender 2020-2021 (120 Units)

Gender	Full Prof	Assoc Prof	Asst Prof	Other T-T	Total T-T
Total Faculty	262	267	267	7	803
Male	70.6%	69.3%	72.3%	100.0%	71.0%
Female	27.1%	30.3%	26.2%	0.0%	27.6%
Not Reported	2.3%	0.4%	1.5%	0.0%	1.4%
Percent Female*	27.7%	30.5%	26.6%	0.0%	28.0%

*as a percentage of those for whom gender was reported

Table 20: Tenure-track Faculty Headcount Breakdown by Race/Ethnicity 2020-2021 (120 Units)

Race/Ethnicity	Full Prof	Assoc Prof	Asst Prof	Other T-T	Total T-T
Total Faculty	262	267	267	7	803
Nonresident Alien	0.4%	0.7%	6.4%	0.0%	2.5%
American Indian/Alaska Native	0.0%	0.0%	0.4%	0.0%	0.1%
Asian	24.4%	21.3%	28.1%	0.0%	24.4%
Black or African-American	0.8%	4.5%	3.4%	0.0%	2.9%
Native Hawaiian/ Pacific Islander	0.4%	0.4%	0.0%	0.0%	0.2%
White	61.8%	64.0%	52.4%	100.0%	59.8%
Multiracial, Not Hispanic/Latino	0.4%	1.9%	0.4%	0.0%	0.9%
Hispanic/ Latino, Any Race	1.5%	1.9%	2.2%	0.0%	1.9%
Resident, Race/Ethnicity Unknown	3.1%	0.7%	1.1%	0.0%	1.6%
Total Residency Known	92.7%	95.5%	94.4%	100.0%	94.3%
Residency Unknown	7.3%	4.5%	5.6%	0.0%	5.7%
Black+Hisp+ NatAm+NatHaw +Multi*	3.3%	9.0%	6.7%	0.0%	6.3%

*as a percentage of those for whom residency is known\

This year's respondents reported more tenure-track positions sought during the 2019-2020 recruiting period than did last year's (89 vs 82), and a slightly higher percentage of them were filled as compared with last year's report (77.5% vs 74.4%). However, this year's respondents reported fewer visiting faculty, full-time non-tenure-track faculty, and part-time/adjunct faculty positions sought (Table 21). The table indicates that one more full-time non-tenure-track faculty member was hired than was sought. This occurred because one of the responding units recruited for a tenure-track position, but the candidate hired for it decided to take a non-tenure track position instead.

There was a larger percentage of females, among this year's newly hired faculty for whom gender is known, than was reported last year (34.9% vs 20.0%). This is consistent with the earlier observation of increased gender diversity compared with last year

among current faculty. There was less racial/ethnic diversity in this year's recruiting class (4.8% aggregate across Black, Hispanic, Native American, Native Hawaiian/Pacific Islander, and two or more races, vs 6.8% last year, among those whose residency is known; 5.0% vs 7.7% last year among those whose residency and race/ethnicity is known). However, with such small numbers in these categories, a difference of one or two can change the year-to-year comparison in a meaningful way (Table 22).

Table 21: Faculty Recruiting During 2019-2020 (63 Respondents)

Faculty Type	Number Sought	Avg/Unit	Number Filled	Success Rate
Tenure-track	89	1.41	69	77.5%
Full Professor			2	
Associate Professor			9	
Assistant Professor			57	
Other			1	
Visiting	13	0.21	12	92.3%
FT Non-TT	10	0.16	11	110.0%
PT/Adjunct	33	0.52	33	100.0%

Table 22: Gender and Race/Ethnicity of Newly Hired Faculty 2020-2021

Gender	Ten-Track	% of Total
Male	41	59.4%
Female	22	31.9%
Unknown	6	8.7%
% Female among those whose gender is known		34.9%
Race/Ethnicity	**Ten-Track**	**% of Total**
Nonresident Alien	4	5.8%
American Indian/ Alaska Native	0	0.0%
Asian	23	33.3%
Black or African-American	1	1.4%
Native Hawaiian/ Pacific Islander	0	0.0%
White	30	43.5%
Multiracial, not Hispanic/Latino	1	1.4%
Hispanic/Latino, Any Race	1	1.4%
Resident, Race/Ethnicity Unknown	3	4.3%
Total Residency Known	63	91.3%
Residency Unknown	6	8.7%
Black+Hisp+ NatAm+ NatHaw+Multi*	3	4.8%

*as a percentage of those for whom residency is known

Table 23 contains information about the extent to which different types of responding departments require a specific level of degree in order to hire, tenure, or promote tenure-track faculty. These fractions do not change much from year to year. Except for hiring full-time non-tenure-track faculty, the vast majority of departments require the doctoral degree for any of these types of actions; however, hiring of assistant professors without doctoral degrees appears to be more common at private institutions than at public institutions. This has been the case for the past few years.

Fewer faculty departures were reported among this year's respondents, with 39 departments reporting a total of 46 departures, compared with 40 departments reporting a total of 56 departures last year. Retirement and departure for other academic positions continue to be the primary reasons that faculty members leave. However, this year's respondents reported a smaller fraction of departures due to retirement (30.4% vs 46.4% last year) and somewhat larger fractions due to leaving for another academic position or to changing from full-time to part-time (Table 24). The extent to which faculty were as mobile once the COVID pandemic hit during early 2020 likely influenced these statistics.

Tenure-track faculty salary data is reported in Tables 25 and 26. The former table reports those departments that provided data about individual faculty members. The median values reported in these tables are true medians of the collection of individual faculty members from these units. The latter table reports all departments that provided salary information, both those providing individual salaries and those that reported only aggregated averages by faculty rank. For Table 26, the medians are medians of these department averages, so they are not in general true medians, nor true averages. Unfortunately, as has been the case for the past several years, many fewer departments reported individual salaries than reported aggregated salaries (27 vs 46). However, this year we have only 73 units in total for whom we have some salary data, versus 89 last year.

Median individual salaries were higher at public and at master's-granting departments than, respectively, at private and non-master's-granting. Medians of the aggregated salaries showed the same direction of difference between master's and non-master's-granting respondents at all ranks, and public vs private at the full professor rank. However, medians of the private aggregated salaries of associate and assistant professors were higher at private institutions than at public institutions among this year's respondents.

SUMMARY AND CONCLUSION

We now have three years' worth of comprehensive NDC data about student enrollment and graduates in the various computing disciplines. Figures 5A and 5B illustrate the changes in degree production in the NDC bachelor's and associate's degree programs, respectively, while Figures 6A and 6B show the comparable changes in enrollment.

To a large extent, this 2017-2018 through 2019-2020 period is pre-COVID. However, graduation results from 2019-2020 may have been influenced by the pandemic since both the job market and university programming were seriously impacted by closures during the spring semester of 2020. The bachelor's graduation data show overall year-over-year increases during this period, with the exception of a small decrease between 2018-2019 and 2019-2020 in the IS discipline. Associate's pro-

Table 23: Degree Required for Faculty Personnel Decisions, 2020-2021

Required Degree	Hiring Full Prof	Hiring Assoc Prof	Hiring Asst Prof	Hiring FT Non-TT	Tenure	Promotion to Full Prof	Promotion to Assoc Prof
Overall (107)							
Doctoral	96.2%	89.4%	76.4%	13.3%	87.5%	97.1%	85.7%
Masters	3.8%	10.6%	23.6%	82.9%	11.5%	2.9%	14.3%
Bachelors	0.0%	0.0%	0.0%	3.8%	1.0%	0.0%	0.0%
Public (34)							
Doctoral	97.1%	93.9%	82.4%	9.1%	87.9%	97.0%	84.8%
Masters	2.9%	6.1%	17.6%	87.9%	9.1%	3.0%	15.2%
Bachelors	0.0%	0.0%	0.0%	3.0%	3.0%	0.0%	0.0%
Private (73)							
Doctoral	95.8%	87.3%	73.6%	15.3%	87.3%	97.2%	86.1%
Masters	4.2%	12.7%	26.4%	80.6%	12.7%	2.8%	13.9%
Bachelors	0.0%	0.0%	0.0%	4.2%	0.0%	0.0%	0.0%
Non-Master's (78)							
Doctoral	96.1%	86.8%	71.4%	16.9%	85.5%	96.1%	81.8%
Masters	3.9%	13.2%	28.6%	77.9%	13.2%	3.9%	18.2%
Bachelors	0.0%	0.0%	0.0%	5.2%	1.3%	0.0%	0.0%
Master's (29)							
Doctoral	96.6%	96.4%	89.7%	3.6%	92.9%	100.0%	96.4%
Masters	3.4%	3.6%	10.3%	96.4%	7.1%	0.0%	3.6%
Bachelors	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table 24: Tenure-track Faculty Departures 2020-2021 (75 Responses)

	NDC
Responding units with departures	39
Total number of departures	46

Reason for Departure (percent)	
Retired	30.4%
Deceased	6.5%
Other ac position	32.6%
Non-ac position	6.5%
Changed to PT	8.7%
Other reason	10.9%
Reason unknown	4.3%

Table 25: Median Faculty Salaries 2020-2021 (from Individual Salary Data)

	Overall	Public	Private	Non-Master's	Master's
Units responding	27	15	12	21	6
Full Professor					
Number of individual faculty	37	26	11	20	17
Median Salary	109,391	112,402	92,700	107,259	114,709
Associate Professor					
Number of individual faculty	56	38	18	32	24
Median Salary	91,291	93,910	84,728	86,143	103,324
Assistant Professor					
Number of individual faculty	50	36	14	28	22
Median Salary	84,677	88,568	77,000	77,000	91,800
Other					
Number of individual faculty	32	29	3	7	25
Median Salary	61,000	61,000	104,040	59,665	61,000

Table 26: Faculty Salaries 2020-2021 (from Aggregate Salary Data)

	Overall	Public	Private	Non-Master's	Master's
Units responding	73	31	42	48	25
Full Professor					
Units responding	57	25	32	32	25
Average of Median Salary	112,480	115,922	109,791	105,811	121,016
Associate Professor					
Units responding	61	29	32	37	24
Average of Median Salary	90,614	88,930	92,193	87,867	94,680
Assistant Professor					
Units responding	55	26	29	33	22
Average of Median Salary	81,048	78,986	83,039	77,887	85,722
Other					
Units responding	32	17	15	10	22
Average of Median Salary	64,119	61,443	66,796	54,957	69,117

grams had an overall increase in graduates from 2017-2018 to 2018-2019, but an overall decrease from 2018-2019 to 2019-2020. Only the cybersecurity discipline showed increases in both periods, consistent with the sizeable increase in the number of institutions offering cybersecurity programs leading to associate's degrees. As we noted earlier in this report, computer science had a decrease not only in overall degrees, but also in the number of institutions offering associate's programs. Yet their degree production per institution increased. This suggests that some associate's institutions may be putting resources into new cybersecurity programs and removing their small computer science programs. The 2019-2020 decrease in the number of associate's degrees in the information technology discipline suggests that cybersecurity programs also may be drawing information technology students, especially those interested in security. It will be interesting to see if there continues to be a similar relationship between the development of new cybersecurity programs and the programs in the other associate's disciplines. We observed earlier that there also are more institutions offering cybersecurity bachelor's programs. Perhaps this will help associate's students who want to continue to a bachelor's cybersecurity program to be able to do so.

There are mixed results during this period relative to enrollment change, at both the bachelor's and associate's levels. Among bachelor's programs, the information systems discipline experienced decreases in both years, while computer

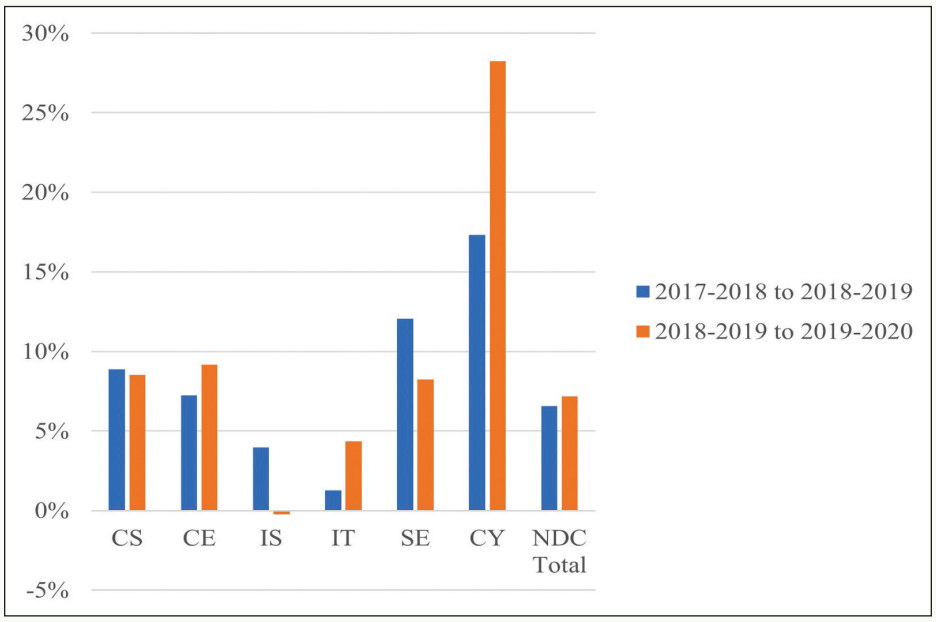

Figure 5A: Bachelor's Degree Percentage Changes

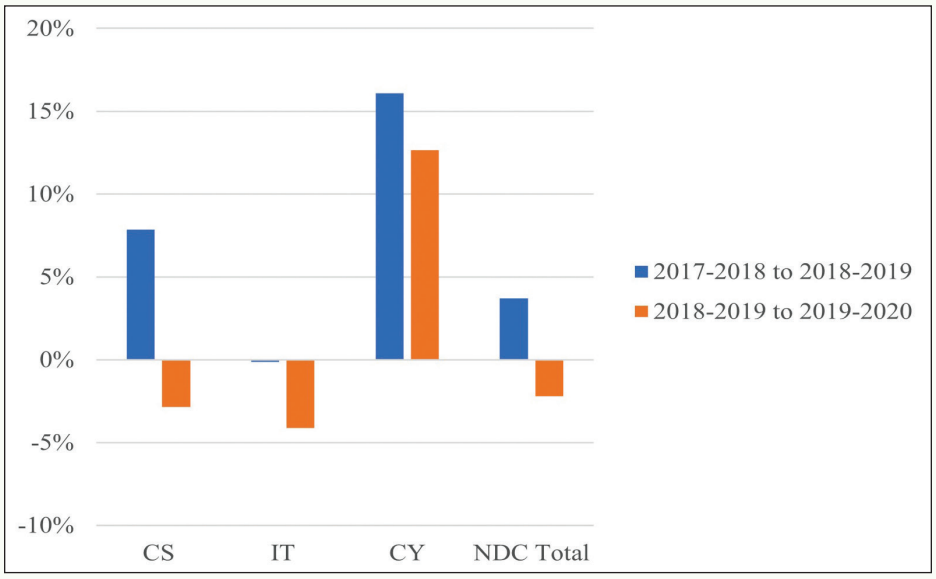

Figure 5B: Associate's Degree Percentage Changes

engineering exhibited a slight decrease between 2018-2019 and 2019-2020. The other four disciplines showed increases each year, and aggregate enrollment in the six computing disciplines increased each year. Among associate's programs, information technology enrollment decreased in both years, cybersecurity enrollment increased each year, and computer science enrollment increased between 2017-2018 and 2018-2019 but decreased between 2018-2019 and 2019-2020. Aggregate associate's enrollment in the three computing disciplines also increased between 2017-2018 and 2018-2019 but decreased between 2018-2019 and 2019-2020.

How do these computing enrollment trends compare with other disciplines? We examined undergraduate enrollment statistics for these three years published by NCES and disaggregated by institution type [6]. We used data about 2-year institutions to approximate the overall enrollment for associate's programs, and we used data about 4-year non-R1 or R2 institutions to approximate the overall enrollment for bachelor's programs. Overall enrollment at 2-year institutions declined each year during this period. The amount of decline in the NCES report is somewhat different from that reported in the AACC report mentioned earlier [4], due to the different methods of aggregating institutions in the two reports, but in each case the declines are between 2.0 and 3.3% each year. At non-R1 or R2 4-year institutions, enrollment rose very slightly between 2017-18 and 2018-19 and then declined between 2018-19 and 2019-20. Thus, the bachelor's enrollment changes in computing observed in our NDC Study during this period were more favorable than were overall enrollment changes at 4-year non-R1 or R2 institutions, and associate's enrollment changes in our NDC Study were more favorable than were overall enrollment changes at 2-year institutions. Figures 6A and 6B include the NCES enrollment changes to illustrate this result.

Gender diversity in computing clearly is low compared with overall diversity in undergraduate education. The NCES data shows that, in 2019-2020, female undergraduate enrollment

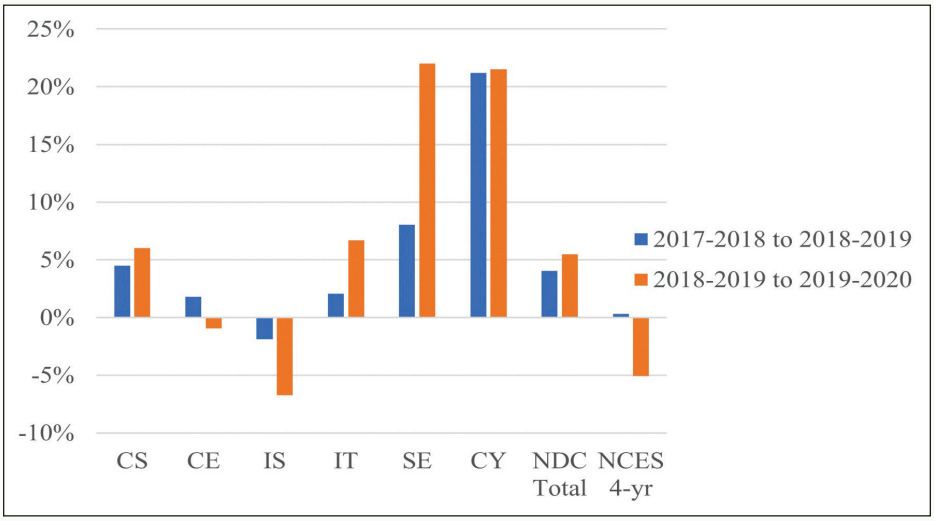

Figure 6A: Bachelor's Enrollment Percentage Changes

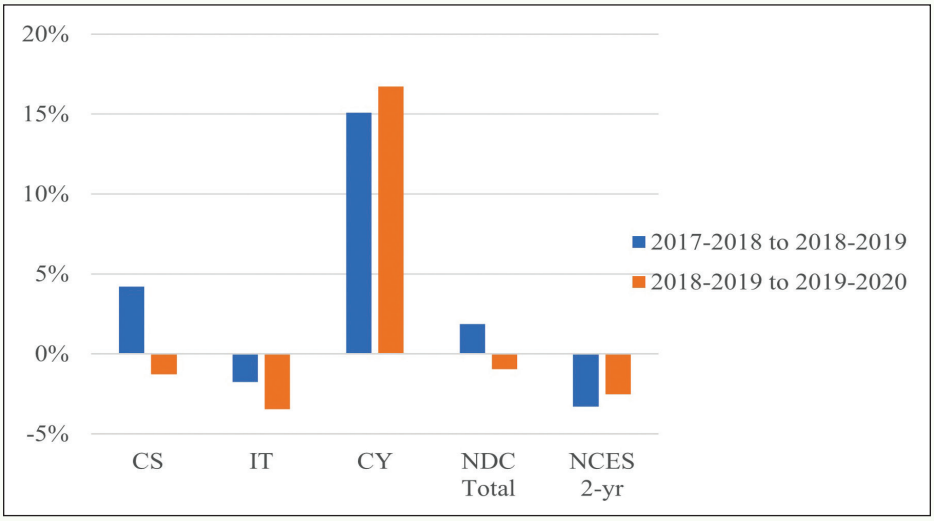

Figure 6B: Associate's Enrollment Percentage Changes

It will be interesting to see how the pre-COVID trends reported here in this ninth annual summary compare with those in the next year or two, as the United States and the rest of the world emerge from their significant pandemic-induced operational changes.

at 4-year institutions was 56.5% (6,191,175 of the total 4-year undergraduate enrollment of 10,966,022). These data include R1 and R2 institutions. Female undergraduate enrollment at 2-year institutions was 57.6% (3,225,361 out of 5,599,044). In contrast, representation of females among the overall enrolled computing population is in the low 20% range overall at both the bachelor's and associate's levels, whether or not doctoral-granting institutions are included.

Diversity comparisons with respect to race/ethnicity are much different. The NCES data show that, in 2019-2020, representation of students other than White, Asian, or Non-resident Aliens was 46.3% in 2-year institutions and 38.3% in non-R1 or R2 4-year institutions. Our computing data show comparable figures of 43.2% and 37.2%, respectively. While computing's race/ethnicity totals are still below the overall representation across all disciplines, the gap is not nearly as great as it is for gender. Moreover, computing enrollment among Black students is 15.2% of associate's program enrollment and 15.4% of NDC bachelor's program enrollment. Comparable statistics from NCES are 14.0% at 2-year institutions and 14.1% at non-R1 or R2 4-year institutions. From an overall enrollment perspective, therefore, Black students do not seem to be under-represented in computing at non-doctoral-granting institutions, a result that may be surprising to many. Students of two or more races also are not under-represented at non-R1 or R2 institutions.

Faculty data also likely was affected by the pandemic. The administrative disruptions to regular work activities probably affected our response numbers this year, and hiring and salary decisions also would have been affected by the pandemic.

It will be interesting to see how the pre-COVID trends reported here in this ninth annual summary compare with those in the next year or two, as the United States and the rest of the world emerge from their significant pandemic-induced operational changes. ❖

References

1. Accreditation Board for Engineering and Technology. https://abet.org/accreditation/accreditation-criteria. Accessed 2021 June 16.
2. Association for Computing Machinery Curriculum Recommendations. https://acm.org/education/curricula-recommendations. Accessed 2021 June 16.
3. Carnegie Classifications. https://carnegieclassifications.iu.edu. Accessed 2021 June 16.
4. Juszkiewicz, J. (2020, July). *Trends in Community College Enrollment and Completion Data, Issue 6*. Washington, DC: American Association of Community Colleges.
5. National Center for Education Statistics (2019). CIP Codes. http://nces.ed.gov/ipeds/cipcode/browse.aspx?y=56. Accessed 2021 June 16.
6. National Center for Education Statistics. *Digest of Education Statistics*. http://nces.ed.gov/programs/digest. Accessed 2021 June 21.
7. National Student Clearinghouse. https://www.studentclearinghouse.org. Accessed 2021 June 16.
8. Zweben, S., Tims, J. and Timanovsky, Y., ACM-NDC Study 2019-2020: Eighth Annual Survey of Non-Doctoral-Granting Departments in Computing, *ACM Inroads* 11, 3 (2020), 26-37.
9. Zweben, S. and Bizot, B. 2020 CRA Taulbee Survey. *Computing Research News*, 33, 5 (2021), 2-68; http://www.cra.org/resources/taulbee/. Accessed 2021 June 16.

Stuart H. Zweben
Department of Computer Science and Engineering
The Ohio State University
2015 Neil Avenue
Columbus, OH 43210
zweben.1@osu.edu

Jody Tims
Executive Director of Khoury College in the Global Network Valley and
Professor of the Practice—San Francisco/Silicon Valley
Northeastern University, 360 Huntington Ave.
Boston, Massachusetts 02115 USA
j.tims@northeastern.edu

Cindy Tucker
Professor of Computer and Information Technologies
Bluegrass Community and Technical College (BCTC)
470 Cooper Dr, Lexington, KY 40506 USA
cindy.tucker@kctcs.edu

Yan Timanovsky
Education and Professional Development Manager
Association for Computing Machinery
1601 Broadway, 10th fl., New York, NY 10019 USA
timanovsky@hq.acm.org

DOI: 10.1145/3485245