Chapter 6

Two-Year College Mathematics Programs Enrollment, Course Offerings, and Instructional Practices

This chapter reports estimated enrollment and instructional practices in courses offered in fall 2000 in the approximately 1053 two-year college mathematics programs in the United States. Also included in this chapter are total enrollment in two-year colleges, average class size, trends in availability of mathematics courses, enrollment in mathematics courses offered outside of mathematics programs, and services available to mathematics students. The data are compared with the results of the 1965, 1970, 1975, 1980, 1985, 1990, and 1995 CBMS surveys. Further analysis of many of the items discussed in this chapter can be found in Chapter 1 of the current report where they are discussed from a comprehensive point of view in comparison to similar data for four-year colleges and universities.

Unlike the 1990 and earlier CBMS surveys, computer science courses taught *outside* the mathematics program, and the faculty who taught them, were *not* considered part of the "mathematics program" in the 1995 survey or in this 2000 survey. In the current report, no computer science courses taught, for example, by a separate computer science department are included as mathematics program enrollment. The 1995 CBMS survey also did not include such computer science courses, except for their inclusion in the "Other" category in the 1995 version of Tables TYR.15 and TYR.16. In the current report, computing courses taught *within* the mathematics program are appropriately labeled in Tables TYR.3 and 4. They are *not* included in Table TYR.2 which reports only *mathematics* (including statistics) course enrollment within mathematics programs for all years and hence allows historical comparison.

The numbers given for two-year colleges in the current report were projected from a stratified random sample of 300 non-profit two-year colleges with mathematics programs. Survey forms were returned by 179 colleges (60% of the sample). Of these, 94% were public colleges and 6% were private. In 1995 there was a 65% return (163 colleges) on a sample base of 250 schools, 96% being public and 4% private. The 2000 sample size was 25% larger than that for four-year institutions because of the greater variability among two-year schools. For more information on the sampling procedure used in this survey, see Appendix II. A copy of the two-year college questionnaire may be found in Appendix V.

Highlights

- Although the number of students enrolled in two-year colleges rose about 2% between 1994 and 1998 (the latest year at the time of this writing for which firm data is available from NCES, the National Center for Education Statistics), enrollment in mathematics and statistics courses taught in two-year college mathematics programs dropped from 1995 to 2000 by about 7.5%. See Tables TYR.1 and TYR.2.
- Two-year and four-year schools ended the decade with mathematics enrollments at about what they were in 1990 but followed very different paths to this result. Four-year enrollments fell from 1990 to 1995 and rebounded in 2000 to their earlier levels. By contrast, two-year enrollments rose sharply from 1990 to 1995 but by 2000 had fallen back to 1990 levels. See Table SE.1 in Chapter 1.
- Enrollment in remedial classes accounted for over half (55%) of mathematics program enrollment in two-year colleges. See Table TYR.4.
- Remedial level courses, which lost 37,000 enrollments, accounted for the largest segment of the enrollment decline. This was an almost 5% remedial mathematics enrollment drop from 1995 to 2000. See Table TYR.4.
- The calculus segment, which includes both mainstream and non-mainstream calculus, had the largest *percentage* enrollment decrease (18%) from 1995 to 2000. This decline was about 23,000 students. Non-mainstream calculus was particularly hard hit with a 38% drop in enrollment in the first term course. (In this survey, "mainstream" refers to the calculus courses which lead on to more advanced mathematics courses such as Differential Equations, and are taken by, among others, engineering, physics, and science majors.) See Tables TYR.3 and TYR.4.
- Mathematics courses showing enrollment percentage increases from 1995 to 2000 were Elementary Statistics (3%), Mathematics for Liberal Arts (13%), and Mathematics for Elementary School

Teachers (12.5%). These were the only courses to show increases. See Table TYR.3.

- During the two-academic-year period of 1999–2000 and 2000–2001, 65% of all two-year colleges offered a pre-calculus/elementary functions course, a nearly twenty percentage point increase compared to the 1994–1995 and 1995–1996 period studied by CBMS1995. The percentage of two-year colleges offering a combined college algebra/trigonometry course during that same two-year period almost doubled to 32%. See Table TYR.5.
- About half of two-year colleges offered a special mathematics course for pre-service K–8 teachers in either academic year 1999–2000 or 2000–2001. Fewer than a quarter assigned a faculty member to coordinate pre-service K–8 teacher education. See Table PSE.3 in Chapter 2 and also the discussions in Chapter 2 and in Chapter 7 under Special Topics.
- In comparison to 1995, in fall 2000 an increasing percentage of two-year colleges, but still no more than 50%, offered specialized courses such as Linear Algebra, Mathematics for Liberal Arts, and Mathematics for Elementary School Teachers. See Table TYR.5.
- On average, almost 90% of mathematics class sections at two-year colleges met the size recommendations of the Mathematical Association of America, namely, that undergraduate mathematics classes should not exceed 30 students. The average section size in all mathematics courses was 23.7, an almost two student drop in comparison to the 1995 survey results. The average section size of individual courses did not vary much from that number. Only 10% of sections had an enrollment above 35. See Tables TYR.7 and TYR.8.
- In fall 2000, part-time faculty members, including those paid by third parties such as school districts, constituted about 69% of the total faculty and taught 46% of all class sections. The percentage of sections taught by part-time faculty rose by 8 percentage points from fall 1995 to fall 2000. The part-time faculty teaching percentage varied by type of course, with part-time faculty members teaching 58% of remedial courses and 15% of mainstream calculus courses. The first number rose by 11 percentage points between 1995 and 2000, and the second dropped by 2 percentage points. See Tables TYR.9 and TYR.17 and the 1995 CBMS survey report.
- The predominant instructional modality continued to be the standard lecture method. The graphing calculator was widely used in all courses beginning with College Algebra. Of mainstream Calculus I sections, at least 30% used either a writing component or group projects or both, a proportion that has grown steadily since 1990. See Tables TYR.10 and TYR.11.
- Virtually all two-year colleges with mathematics programs had diagnostic or placement testing. About 98% had a mathematics lab or tutorial center. See Table TYR.12.
- Enrollment in mathematics courses outside of the mathematics program (e.g., in a developmental studies department) continued to decline and at a rate faster than overall mathematics program enrollment (23% versus 7.5%). See Table TYR.15.

Enrollment, Class Size, and Course Offerings

Trends in the Number of Two-Year College Students

About 5,516,000 students were enrolled in two-year colleges in fall 1998. This was the most recent confirmed figure available from the National Center for Education Statistics (NCES) for use in the fall 2000 CBMS report. For enrollment projections beyond 1998, see Chapter 1 of the current report, Table SE.1. NCES data can be accessed as follows: Digest of Education Statistics 2000, Chapter 3: Post-Secondary Education, http://nces.ed.gov/pubs2001/2001034c.pdf.

According to NCES data, between 1990 and 1994 the number of students enrolled in two-year colleges in the United States had fallen about 8%. But by 1998 this total two-year college enrollment had rebounded 2%. See Table TYR.1.

Enrollment in two-year colleges in fall 1998 constituted about 38% of the total enrollment in post-secondary institutions, namely, 5,516,444 students in a total post-secondary enrollment of 14,549,189. The percentage is even higher, namely, 44%, when two-year college enrollment is compared to total post-secondary *undergraduate* enrollment (12,476,914) for 1998. The 38% figure was the same percentage reported for fall 1994 in the fall 1995 CBMS survey. The comparative analysis in Chapter 1 of the current report shows that in fall 1995 two-year colleges taught 41% of all undergraduate mathematics enrollments.

The numbers in the preceding paragraphs for total post-secondary enrollment or for total undergraduate enrollment are reported in Table 178 of the NCES web page, part of the Integrated Post-Secondary Education Data System (IPEDS). We also observe that, using 1997 data, IPEDS surveys found that, as in 1994, the vast majority of two-year college students (96%) were enrolled in public colleges rather than in private or for-profit colleges. See Table 177 in the NCES reference given above. In 1994 the figure for enrollment in public two-year colleges was 94%.

TABLE TYR.1 Total enrollment (all disciplines) and percentage of part-time enrollments in two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1994, and 1998.

	1970	1975	1980	1985	1990	1994	1998
Number of students	2,499,837	4,069,279	4,825,931	4,730,235	5,850,803	5,396,636	5,516,444
Percentage part-time	48	54	63	65	65	64	62

Sources: 1970-1990: Community, Junior, and Technical College Directory, 1972, 1976, 1981, 1986, and 1991, AACJC, One Dupont Circle, NW, Washington, DC 20036
Source 1994: American Association of Community Colleges, 1994 Fall Survey.
Source 1998: National Center for Educational Statistics IPEDS Fall enrollment Survey.

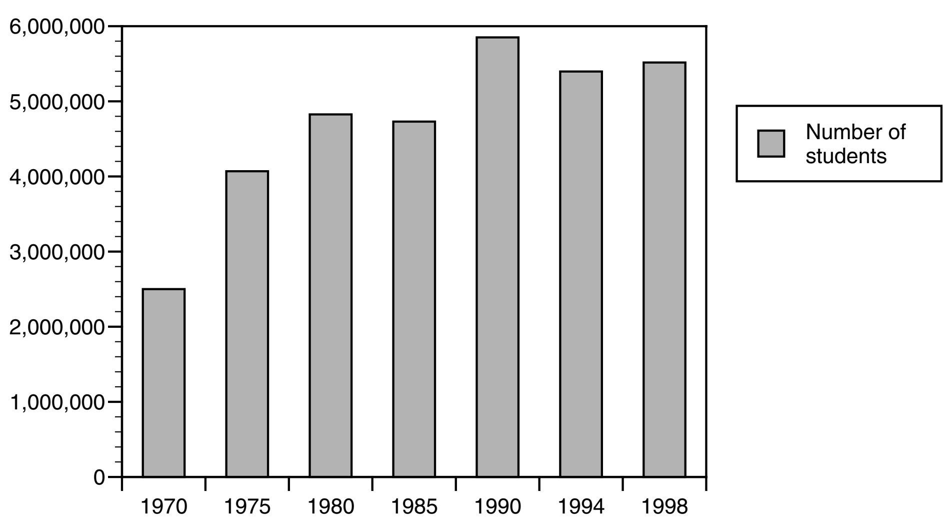

FIGURE TYR.1.1 Total enrollments (all disciplines) in two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1994, and 1998.

Trends in Enrollment in Two-Year College Mathematics Programs

While overall two-year college enrollment was rising from 1994 to 1998, Table TYR.2 shows enrollment in mathematics and statistics courses within mathematics programs declined by 7.5% in the five-year period from 1995 to 2000. As was the case in CBMS1995, Table TYR.2 does not include any computer science enrollments. Enrollment totals in Table TYR.2 reported from CBMS surveys before CBMS1995 have been adjusted to remove all computer science enrollments. For more detail on this reporting issue, see the second paragraph at the start of the current chapter.

In addition to what follows, the reader should consult Chapter 1 of the current report. Chapter 1 contains a detailed analysis of mathematics department enrollments at both two-year and four-year schools over the decade 1990 to 2000 and also contains enrollment comparisons between two-year and four-year schools. These comparisons include computer science enrollments reported within two-year college mathematics programs.

The interesting pattern which emerged over the decade 1990 to 2000 is that both two-year and four-year schools ended the decade with mathematics enrollment at about the same level each reported at the start of the decade. But they followed very different paths in reaching that point. Four-year enrollments fell from 1990 to 1995 and rebounded in 2000 to their earlier levels. By contrast, two-year enrollments rose sharply from 1990 to 1995 but by 2000 had fallen to 1990 levels.

TABLE TYR.2 Enrollments in Mathematics and Statistics (no Computer Science) courses in Mathematics Programs at two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1995, and 2000.

	1970	1975	1980	1985	1990	1995	2000
Mathematics & Statistics enrollments	571,000	864,000	953,000	936,000	1,295,000	1,456,000	1,346,724

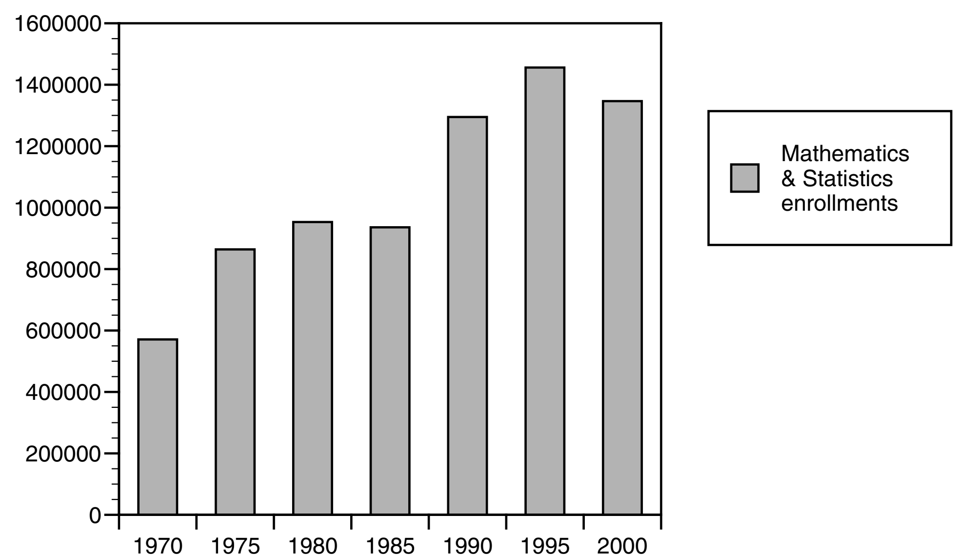

FIGURE TYR.2.1 Enrollments in Mathematics and Statistics courses (no Computer Science) in Mathematics Programs in two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1995, and 2000.

The 2000 survey confirmed that the typical two-year college mathematics program principally offered courses for remedial or general education and in support of disciplinary majors other than mathematics. This is consistent with past CBMS surveys which showed that few two-year college students intended to transfer to a four-year college or university and study mathematics as a major.

Trends in Enrollment in Specific Courses

Remediation comprised over half of mathematics program enrollment (55%) in fall 2000, with courses at the pre-calculus level accounting for another 20% of enrollment. However, in spite of a small overall enrollment increase at two-year colleges from 1994 to 1998, almost all major mathematics enrollment categories declined from 1995 to 2000, including remediation. See Table TYR.4. These declines, respectively by category, are remediation 5%; pre-calculus 7%; calculus 18%; and computing 9%. The category "other courses" declined 19%. Only statistics/probability showed a rise in enrollment from 1995 to 2000, namely, 3%.

Table TYR.3 reports enrollment in *individual* courses. Excepting two very low enrollment computer courses, only 3 of the 38 courses listed in CBMS2000 increased in enrollment from fall 1995 to fall 2000. During that period, enrollment in Elementary Statistics grew by about 3%, reaching 71,000 students in fall 2000. Mathematics for Elementary School Teachers grew by 12.5%, reflecting the increased involvement of two-year colleges in teacher education. Enrollment in Mathematics for Liberal Arts rose by about 13%, from 38,000 to 43,000.

Enrollments in the other 33 individual courses either were unchanged from 1995 levels or decreased markedly. The steepest enrollment declines occurred in Trigonometry (30%), Linear Algebra (40%), Business Mathematics (40%), and the first semester of non-mainstream calculus (38%).

Table TYR.4 reports enrollment for categories of courses. It is constructed from Table TYR.3 and reports head counts and percentages from 1970 through 2000 for the following course groupings: remedial, precalculus, calculus, statistics, computing, and an amalgam of other courses. Each category consists of five or more specific courses from Table TYR.3.

The reader should recall, as noted elsewhere, that mainstream calculus consists of those calculus courses which lead to more advanced mathematics courses and is usually required of majors in mathematics, the physical sciences, and engineering. Non-mainstream calculus includes the calculus courses most often taught to biology, behavioral science, and business majors. In addition, the reader should recall the two comments above about how computer science enrollments inside and outside of mathematics have been reported in Tables TYR. 2, 3, and 4.

TABLE TYR.3 Enrollment (in thousands) in Mathematics, Statistics, and Computer Science courses in Mathematics Programs at two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1995, and 2000.

Course number	Type of course	1970	1975	1980	1985	1990	1995	2000
	Remedial level							
1	Arithmetic & Basic mathematics	57	100	146	142	147	134	122
2	Pre-algebra	na	na	na	na	45	91	87
3	Elementary algebra (HS level)	65	132	161	181	262	304	292
4	Intermediate algebra (HS level)	60	105	122	151	261	263	255
5	Geometry (HS level)	9	9	12	8	9	7	7
	Precalculus level							
6	College algebra (above Intrmed alg)	52	73	87	90	153	186	173
7	Trigonometry	25	30	33	33	39	43	30
8	College algebra & trig (combined)	36	30	41	46	18	17	16
9	Intro to mathematical modeling	na	na	na	na	na	na	7
10	Precalc/ Elem fnctns/ Analyt geom	21	19	19	19	35	50	48
	Calculus level[1]							
11	Mainstream calculus I					53	58	53
12	Mainstream calculus II	58	62	73	80	23	23	20
13	Mainstream calculus III					14	14	11
14	Non-mainstream calculus I	na	8	9	13	31	26	16
15	Non-mainstream calculus II	na				3	1	1
16	Differential equations	1	3	4	4	4	6	5
	Other mathematics courses							
17	Linear algebra	1	2	1	3	3	5	3
18	Discrete mathematics	na	na	na	0	1	3	3
19	Elem statistics (with or w/o Probability)	11	23	20	29	47	69	71
20	Probability (with or w/o Statistics)	5	4	8	7	7	3	3
21	Finite mathematics	12	12	19	21	29	24	19
22	Mathematics for liberal arts	57	72	19	11	35	38	43
23	Math for elementary school teachers	25	12	8	9	9	16	18
24 & 25	Business mathematics	28	70	57	33	26	25	15
26	Technical math (non-calculus)	26	46	66	31	17	17	13
27	Technical math (calculus-based)	3	7	14	4	1	2	2
28	Other mathematics courses	--	--	--	--	--	--	14
	Computing[2]							
29	Computers and society	na	na	na	na	10	10	2
30	Introduction to software packages	na	na	na	na	na	21	16
31	Issues in Computer Science	na	na	na	na	na	0	1
32	Computer programming I	10	6	58	37	32	6	6
33	Computer programming II	na	na	na	5	8	1	2
34	Adv programming & data structures	na	na	na	6	3	1	1
35	Database management systems	na	na	na	na	4	1	1
36	Discrete mathematics for CS	na	na	na	na	na	na	0
37	Other Computer Science courses	---	--	--	--	--	--	10
38	Other Mathematics & CS courses	17	36	64	64	64	32	--
	Total all courses	**584**	**874**	**1048**	**1034**	**1393**	**1498**	**1386**

Note: 0 means fewer than 500 enrollments and na means not available.

[1] Mainstream calculus is for mathematics, physics, science & engineering; non-mainstream calculus is for biological, social, and management sciences.

[2] The computing enrollments for 1995 and 2000 include only those courses taught within Mathematics programs. For earlier years, they also include estimates of enrollment in Computer Science courses taught outside of Mathematics programs.

TABLE TYR.4 Enrollment (in 1000s) in Mathematics, Statistics, and Computer Science courses by type of course in Mathematics Programs at two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1995, and 2000.

Course number	Type of course	1970	1975	1980	1985	1990	1995	2000
1–5	Remedial	191 (33%)	346 (40%)	441 (42%)	482 (47%)	724 (52%)	800 (53%)	763 (55%)
6–10	Precalculus	134 (23%)	152 (17%)	180 (17%)	188 (18%)	245 (18%)	295 (20%)	274 (20%)
11–16	Calculus	59 (10%)	73 (8%)	86 (8%)	97 (9%)	128 (9%)	129 (9%)	106 (8%)
19–20	Statistics	16 (3%)	27 (3%)	28 (3%)	36 (3%)	54 (4%)	72 (5%)	74 (5%)
29–37	Computing[1]	13 (2%)	10 (1%)	95 (9%)	98 (10%)	98 (7%)	43[1] (3%)	39[1] (3%)
17,18, & 21–28	Other	171 (29%)	266 (31%)	218 (21%)	133 (13%)	144 (10%)	160 (11%)	130 (9%)
1–37	**Total all courses**	**584 (100%)**	**874 (100%)**	**1048 (100%)**	**1034 (100%)**	**1393 (100%)**	**1498 (100%)**	**1386 (100%)**

Note: This table was constructed using Table TYR.3. Notice that the breakdown into type of course is different from that in Table SE.3 and Appendix I for four-year colleges and universities.

[1] The computing enrollment for 1995 and later includes only courses taught within Mathematics Programs. For earlier years it includes estimates of enrollments in Computer Science courses taught outside Mathematics Programs.

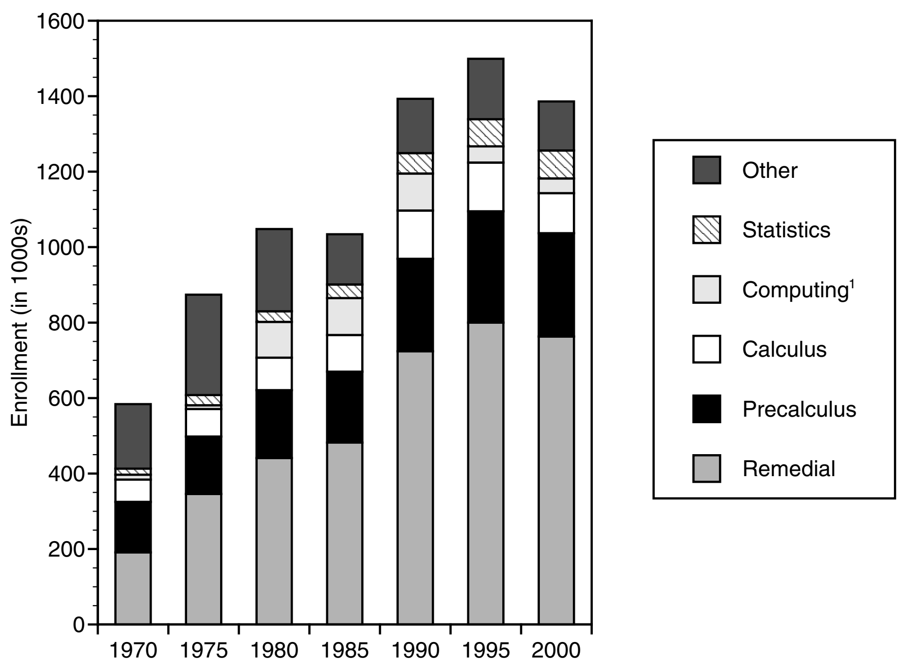

FIGURE TYR.4.1 Enrollment (in 1000s) in Mathematics, Statistics, and Computer Science courses by type of course in Mathematics Programs at two-year colleges: Fall 1970, 1975, 1980, 1985, 1990, 1995, and 2000.

[1] The computing enrollment for 1995 and later includes only courses taught within Mathematics Programs. For earlier years it includes estimates of enrollments in Computer Science courses taught outside Mathematics Programs.

Trends in Availability of Mathematics Courses

As Table TYR.5 reports, every course at the remedial level except Intermediate Algebra was offered at a smaller percentage of schools in 2000 than in 1995. Largest among the drops was a 14 percentage point reduction in the percentage of mathematics programs offering a separate arithmetic skills course.

Historically, Intermediate Algebra is a course more likely to be found inside a mathematics program rather than supervised outside mathematics in a developmental studies department. Such was the case in 1995 for 84% of programs and in 2000 for 90%. This data suggests further solidification of Intermediate Algebra as the bridge course between remedial studies and the mathematics program where, in the presence of separate developmental studies units, the student moves to the mathematics program. Future surveys should investigate how many two-year college mathematics programs actually give associate degree graduation credit for Intermediate Algebra.

In comparison to 1995, the percentage of schools offering a separate college algebra course rose by 4 percentage points. However, the percentage of schools offering a separate trigonometry course dropped by 5 percentage points. By contrast, there was a 15 percentage point rise in offerings of combined college algebra/trigonometry courses and a 19 percentage point increase in offerings of pre-calculus/elementary functions. The first semester of mainstream calculus was offered by 94% of schools in 2000,

TABLE TYR.5 Percentage of the 1,053 two-year college Mathematics Programs teaching selected Mathematics courses at least once in either 1994–1995 or 1995–1996, and at least once in either 1999–2000 or 2000–2001.

Course number	Type of course	1995	2000
1	Arithmetic/Basic mathematics	70	56
2	Pre-algebra	46	41
3	Elementary algebra (HS level)	85	78
4	Intermediate algebra (HS level)	84	90
5	Geometry	17	14
6	College algebra	79	83
7	Trigonometry	71	66
8	College algebra & trigonometry	17	32
9	Introductory mathematical modeling	na	12
10	Precalculus/ Elementary functions/ Analytic geometry	46	65
11	Mainstream calculus I	83	94
12	Mainstream calculus II	79	88
13	Mainstream calculus III	65	67
14	Non-mainstream calculus I	52	40
15	Non-mainstream calculus II	10	6
16	Differential equations	53	59
17	Linear algebra	30	39
18	Discrete mathematics	12	19
19	Elementary statistics	80	83
20	Probability	5	4
21	Finite mathematics	31	32
22	Mathematics for liberal arts	46	50
23	Mathematics for elementary school teachers	43	49
24	Business mathematics (not transferrable[1])	28	14
25	Business mathematics (transferrable[2])	11	19
26	Technical mathematics (non-calculus)	33	36
27	Technical mathematics (calculus-based)	11	9

[1] Not transferable for credit toward bachelors degree.
[2] Transferable for credit toward bachelors degree.

compared to 83% in 1995. However, schools offering the first semester of non-mainstream calculus fell off by 12 percentage points in comparison to 1995.

One new course to which some college algebra enrollment might have migrated since 1995 is Introductory Mathematical Modeling. This course was included for the first time in a CBMS survey in fall 2000. It was offered that semester at 12% of two-year colleges. See Table TYR.5.

The CBMS1995 survey noted that many students at two-year colleges could not complete lower division mathematics requirements in certain majors because courses such as Linear Algebra, Mathematics for Liberal Arts, and Mathematics for Elementary School Teachers were offered at fewer than half of the two-year colleges with mathematics programs. Tables TYR.5 and TYR.6 display an important increase in the availability of these three baccalaureate-essential courses with 39%, 50%, and 49% of institutions offering them, respectively. In 1995, the comparable percentages were 30%, 46%, and 43%.

The increase in the availability of baccalaureate transfer courses may be a small sign of an overall better prepared two-year college mathematics student in fall 2000 when compared to 1995. At a minimum this data suggests a trend of more students passing through or using two-year college mathematics programs on their way to a baccalaureate degree and suggests two-year college mathematics programs are responding to this phenomenon. A separate national study of the number of two-year college students who move on to baccalaureate institutions and of what happens to them after they transfer to baccalaureate institutions, both in general and as regards mathematics, would be very informative.

Just 14% of two-year college mathematics programs offered a high-school-level geometry course in fall 2000, a 3 percentage point drop since 1995. This continues a steady decline, which began in 1980, in geometry enrollment at two-year colleges.

TABLE TYR.6 Percentage of the 1,053 two-year college Mathematics Programs teaching selected Mathematics courses: Fall 1970, 1985, 1990, 1995, and 2000.

Course number	Type of course	Percentage of two-year colleges teaching course 1970	1985	1990	1995	2000
11	Mainstream Calculus I	na	na	na	83	94
16	Differential equations	49	40	53	53	59
17	Linear algebra	17	24	34	30	39
18	Discrete Mathematics	na	3	21	12	19
19	Elementary Statistics	41	61	69	80	83
21	Finite Mathematics	19	27	46	31	32
22	Mathematics for liberal arts	na	25	35	46	50
23	Mathematics for elementary school teachers	48	31	32	43	49
26	Technical Mathematics (non-Calculus based)	41	42	36	33	36
27	Technical Mathematics (Calculus based)	19	18	6	11	9

Average Number of Students Per Section

In fall 2000, the average section size in two-year college mathematics courses continued the downward trend begun ten years earlier, ending the decade with an average section size of 23.7 students. The average section size in fall 2000 dropped from an average size of 25.5 reported in 1995. The average section size in 1990 was 27.8 students. The course levels that experienced the largest decrease in section sizes from 1995 to 2000 were computer science courses, which declined by an average of 4.1 students, precalculus level courses, which declined by an average of 3.2 students, and calculus level courses and elementary statistics courses, each of which declined by an average of 2.7 students. As Table TYR.7 shows, in fall 2000, on average, 9 out of 10 two-year college mathematics program classes met the class size recommendations of at most 30 students per section published by the Mathematical Association of America. [MAA Guidelines].

For a closer examination of individual course types, see Table TYR.8. It presents data on average section size for 37 different courses. In fall 2000, a section size of fewer than 20 students was reported in 30% of these courses while the majority of courses (57%) had between 20 and 25 students. Only 13% of the courses had more than 25 students per section. In CBMS2000 the courses with the largest average size (more than 25 students) were College Algebra & Trigonometry, Intermediate Algebra, College Algebra, Elementary Statistics, and Issues in Computer Science.

TABLE TYR.7 Average section size by type of course in Mathematics Programs at two-year colleges: Fall 1995 and 2000. Also percentage of sections with enrollment above 35: Fall 2000.

Course number[1]	Type of course	1995 average section size	2000 average section size	Percentage of 2000 sections with size > 35
1–5	Remedial	25.7	24.5	10.4
6–10	Precalculus	28.0	24.8	13.6
11–16	Calculus	23.5	20.8	9.0
19–20	Statistics	27.9	25.2	13.2
28–35	Computer Science	22.9	18.8	4.0
1–36	**Total all courses**	**25.5**	**23.7**	**10.3**

[1] For names of specific courses see Table TYR.3.

TABLE TYR.8 Average section size for two-year college Mathematics Program courses: Fall 2000.

Course number	Type of course	Average section size	Course number	Type of course	Average section size
1	Arithmetic & Basic mathematics	22.2	22	Mathematics for liberal arts	24.3
2	Pre-algebra	22.5	23	Math for elementary school teachers	20.9
3	Elementary algebra (HS level)	24.3	24	Business mathematics (not transferable)	19.7
4	Intermediate algebra (HS level)	26.1	25	Business mathematics (transferable)	22.1
5	Geometry (HS level)	21	26	Technical mathematics (non-calculus)	16.5
6	College algebra	25.5	27	Technical mathematics (calculus-based)	17.8
7	Trigonometry	23	28	Other mathematics courses	18.8
8	College algebra & trig. (combined)	26.7	29	Computers and society	20.6
9	Intro to mathematical modeling	20.2	30	Introduction to software packages	20.3
10	Precalculus[1]	23.5	31	Issues in Computer Science	30.6
11	Mainstream calculus I	22.5	32	Computer programming I	20.6
12	Mainstream calculus II	20.4	33	Computer programming II	18.1
13	Mainstream calculus III	15.3	34	Adv programming & data structures	21.4
14	Non-mainstream calculus I	21.6	35	Database management systems	12.9
15	Non-mainstream calculus II	20.3	36	Discrete mathematics for CS	15.1
16	Differential equations	16.1	37	Other Computer Science courses	15.7
17	Linear algebra	17.6			
18	Discrete mathematics	20.4			
19	Elementary statistics	25.2			
20	Probability	22.1			
21	Finite mathematics	22.8			

[1] Includes Precalculus, Elementary functions, Analytic geometry.

Courses Taught by Part-Time Faculty Members

In fall 2000, part-time faculty members made up about 69% of the total mathematics program faculty in two-year colleges, a 4 percentage point increase from 1995. They taught 46% of all sections offered, an 8 percentage point increase since 1995. This percentage varied by type of course. The courses most frequently taught by part-time faculty in fall 2000 were remedial level courses (58% of the sections). The use of part-time faculty for other course types is as follows: technical mathematics (43% of sections), computer science (39%), Elementary Statistics (34%), and Precalculus (33%). Only 15% of mainstream calculus sections were taught by part-time faculty.

Compared with the CBMS1995 report, the percentage of part-time faculty teaching remedial courses grew by 11 percentage points, while the percentage of part-time faculty teaching computer science courses and precalculus courses increased by 6 percentage points and 4 percentage points, respectively. In all other courses the increases were 3 percentage points or less. There were declines in the percentage of part-time faculty teaching mainstream calculus (2 percentage points) and advanced level mathematics courses (4 percentage points).

TABLE TYR.9 Number of sections and number and percentage of sections taught by part-time faculty in Mathematics Programs at two-year colleges by type of course: Fall 2000.

Course number[1]	Type of course	Number of sections	Number of sections taught by part-time faculty	Percentage of sections taught by part-time faculty
1–5	Remedial	29,891	17,413	58
6–10	Precalculus	10,822	3,562	33
11–13	Mainstream calculus	3,942	594	15
14–15	Non-mainstream calculus	784	198	25
16–18	Advanced level	625	76	12
19–20	Statistics	2,937	1,006	34
21–25	Service courses	3,905	1,523	39
26–27	Technical mathematics	816	349	43
28	Other mathematics	695	286	41
29–37	Computer science	2,077	801	39
1–37	**Total all courses**	**56,495**	**25,808**	**46**

[1] For names of specific courses see Table TYR.3.

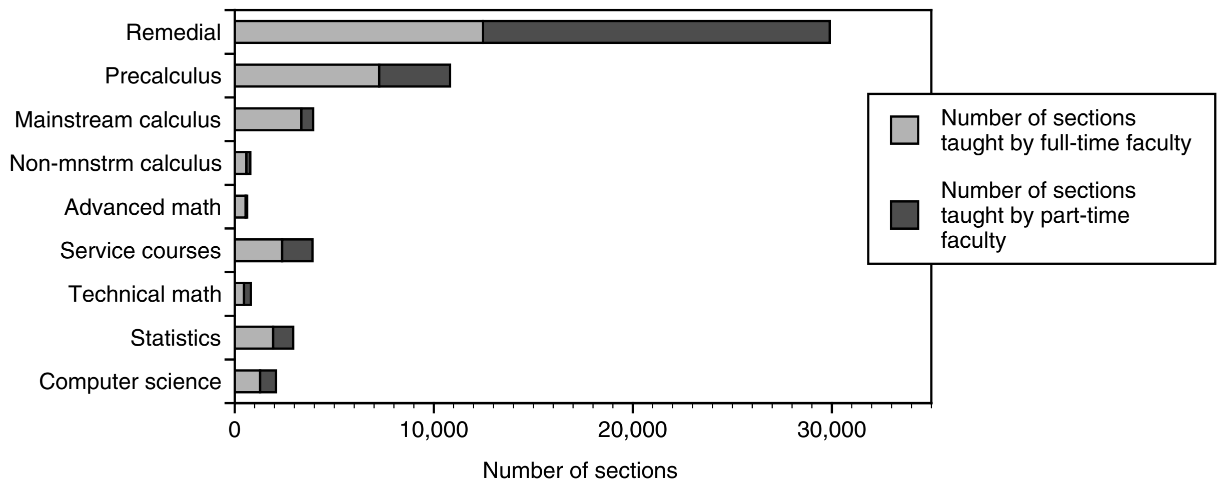

FIGURE TYR.9.1 Number of sections of Mathematics, Statistics, and Computer Science courses taught by full-time and part-time faculty in Mathematics Programs at two-year colleges by type of course: Fall 2000.

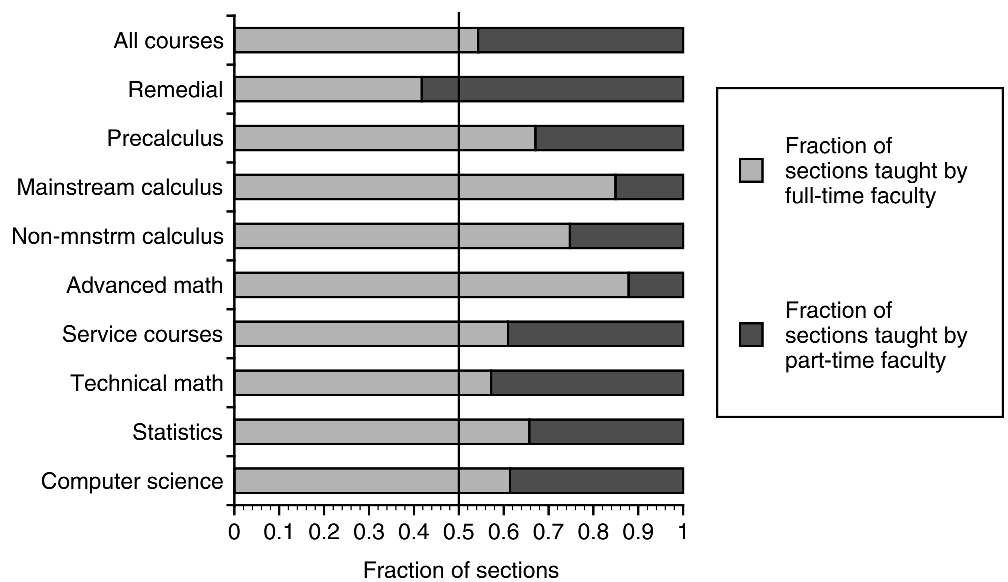

FIGURE TYR.9.2 Fraction of sections of Mathematics, Statistics, and Computer Science courses taught by full-time and part-time faculty in Mathematics Programs at two-year colleges by type of course: Fall 2000.

Instructional Practices

Table TYR.10 presents the percentage of sections that used various instructional practices in different courses. In fall 2000, the predominant instructional method was the standard lecture format, reported in use in 78% of all class sections. This percentage was nearly the same as that reported in the CBMS1995 (77%).

Calculus Courses and Reform Methods of Instruction

In fall 2000, there were clear patterns among various course types in terms of use of the five reform instructional methods included in the survey (use of a graphing calculator, inclusion of a writing component, the use of group projects, computer assignments, and weekly meetings in a computer lab setting). For all calculus courses (both mainstream and non-mainstream) and for precalculus courses as well, the graphing calculator was used more frequently than any other reform method. The percentage of sections using graphing calculators in calculus and pre-calculus courses ranged from 69% to 83%. Not surprisingly, mainstream Calculus I and mainstream Calculus II were taught in a very similar manner. The ordered ranking of the reform methods was the same for both courses, with mainstream Calculus I reporting a slightly greater use than mainstream Calculus II for 4 of the 5 methods. The exception was that mainstream Calculus II placed a slightly greater emphasis on computer assignments than did mainstream Calculus I.

Non-mainstream Calculus I reported a use of all reform methods that was substantially below that of mainstream Calculus I. Table TYR.10 also indicates that there was a greater use of reform methods in non-mainstream Calculus II than in non-mainstream Calculus I. In a somewhat surprising discovery, non-mainstream Calculus II had a higher percentage use of a writing component (39%) and weekly computer labs (19%) than any other calculus course (mainstream or non-mainstream). In interpreting this information, however, the reader needs to keep in mind that non-mainstream Calculus II enrollment in two-year colleges is very small in comparison to the other calculus courses.

Other Courses, Reform Methods, and Distance Learning

Among other mathematics courses, probability courses reported the highest use of computer assignments (59%) and weekly computer lab instruction (48%). With the exception of Computers & Society courses (90%), Introduction to Mathematical Modeling courses had the highest percentage of use of writing assignments (73%). This same course reported a greater emphasis on group projects (86%) than did any other mathematics course. Other courses that placed a high emphasis on the writing component included Elementary Statistics (50%), Mathematics for Elementary School Teachers (66%), and Introduction to Software (62%).

The 1995 CBMS survey inquired about courses taught using television. The 2000 survey modified this question to inquire about courses taught in some "distance learning" format. "Distance learning" was defined as a course structure in which at least half the students in the class received the majority of their instruction via a format in which the instructor was not physically present. Fewer than 1% of mathematics class sections were offered via television in 1995 and only 2.5% in 2000 were described as using distance learning. Among high enrollment courses, College Algebra had 6.7% of sections offered via distance learning and Elementary Statistics had 5.8%. Among low enrollment courses, the second semester of non-mainstream calculus had 19.4% of sections offered via distance learning, but the significance of this number is uncertain because of the small overall enrollment in this course, about 1000 students nationwide.

A comprehensive review, encompassing both two-year and four-year colleges, of fall 2000 data on distance learning instruction in mathematics can be found in Chapter 2 of the current report. The relevant survey questions as regards two-year colleges are in Appendix V.

Comparison of Use of Reform Methods in Calculus: Fall 1995 and Fall 2000

Table TYR.11 tracks the historical data on instructional patterns for two specific teaching techniques arising from the calculus reform movement that began in the mid-1980s. This table presents information on the use of group projects and the inclusion of a writing component in calculus courses. The percentage of sections reporting the use of group projects and writing components increased in all three levels of mainstream calculus, although the rate of increase was not as great as was seen earlier in the reform movement between 1990 and 1995. Among mainstream calculus courses, the largest increase in the use of group projects between 1995 and 2000 was in Calculus II which grew from 18% to 25% of all sections. Mainstream Calculus II also showed the greatest increase in the use of a writing component, increasing by 12 percentage points. Mainstream Calculus I reported an 11 percentage point increase. Among non-mainstream calculus courses, the percentage of sections reporting the use of group projects did not increase between 1995 and 2000. In non-mainstream Calculus I, there was no change in the use of group projects, while in non-mainstream Calculus II there was a decrease of 14 percentage points. The use of a writing component increased slightly in non-mainstream Calculus I (3 percentage points) and quite dramatically in non-mainstream Calculus II (23 percentage points). Once again, however, the reader must note that inferences from the data about non-mainstream Calculus II are affected by the extremely low enrollment reported nationwide in that course.

Other calculus instructional comparisons (1995 versus 2000) can be made by using Table TYR.10 of the current report and the same table in CBMS1995. Specific data is available on the use of graphing calculators, computer assignments, and weekly computer laboratories. For all three methodologies and in all three of mainstream Calculus I, II, and III, percentage of use increased over the five-year period, often sharply. The use of graphing calculators rose 13 percentage points, 11 percentage points, and 6 percentage points, respectively, in the three courses. Computer use rose 12, 21, and 9 percentage points, respectively. For Calculus I and II, there was a modest rise in the use of weekly computer laboratories, 2 and 4 percentage points, respectively. For Calculus III, laboratory use dropped by 3 percentage points. These facts may reflect the difficulty of scheduling regular computer laboratories for the typical community college student body, composed of large numbers of part-time, commuting, or non-residential students.

Comparison of Use of Reform Methods in Courses Other Than Calculus: Fall 1995 and Fall 2000

Comparing Table TYR.10 with the same table in CBMS1995 allows one to make some comments about changes in patterns of instruction in two-year college mathematics programs between 1995 and 2000 for large enrollment mathematics courses other than calculus. Increase in graphing calculator usage was especially dramatic for most courses while use of weekly computer laboratories increased only modestly.

Elementary Algebra experienced notable increases in use of all five methodologies: graphing calculators from 4% to 20%; writing components from 4% to 12%; computer assignments from 7% to 12%; group projects from 7% to 14%; and weekly meetings in a computer laboratory from 10% to 14%. The same 1995 to 2000 comparison for Intermediate Algebra, laid out in the same order, that is, the order of the first five columns of Table TYR.10, was as follows: 17% to 31%; 7% to 13%; 3% to 8%; 11% to 16%; and 7% to 8%. For College Algebra, the change was huge in the use of graphing calculators, as the first of the following comparisons confirms: 38% to 74%; 10% to 21%; 8% to 11%; 13% to 16%; and 4% to 5%. The patterns in Trigonometry and combined College Algebra/Trigonometry paralleled that of College Algebra. In particular, there was an increase from 49% to 67% in the number of sections in Trigonometry using graphing calculators and an increase from 51% to 86% in graphing calculator use in the combined course. In Precalculus/Elementary Functions, graphing calculator usage rose from 55% to 83%. In Finite Mathematics the rise was from 26% to 61%.

Comparison in Use of Reform Methods Between Two-Year and Four-Year Colleges in Fall 2000

In CBMS2000, instructional methodology data for two-year colleges was collected as a percentage of course *sections*. For four-year colleges, instructional methodology data was collected as a percentage of *enrollments*. If one assumes that at two-year colleges percentage of sections closely reflects percentage of enrollment, one can make some comparative statements about the use of reform methods of instruction in two-year and four-year colleges. The assumption is reasonable since few, if any, two-year colleges use the large lecture class format. Enrollment from class section to class section is relatively constant at two-year colleges.

See Chapter 5 of the current report for a discussion of instructional practices at four-year schools. There schools are broken down for analysis into PhD granting institutions, masters degree granting institutions, and baccalaureate only institutions.

In fall 2000, graphing calculators were a much more prevalent instructional tool in calculus courses at two-year colleges than at four-year colleges. For example, in mainstream Calculus I about 78% of sections at two-year colleges used such a calculator whereas at the other extreme only 40% of PhD granting institutions did so. In non-mainstream Calculus I this comparison was 72% to 27%. For both these calculus courses, BA and MA institutions fit between two-year colleges and doctoral institutions in their percentage of use of graphing calculators. In mainstream Calculus I their percentages were 67% and 55%, respectively. For non-mainstream Calculus I they were much closer to two-year colleges with percentages of 63% and 66%. The same pattern was present for Elementary Statistics where, for institutional degree type from Associate to PhD, the use of graphing calculators was 59%, 51%, 49%, and 38%, respectively.

Interestingly, a pattern similar to that for graphing calculators in the preceding paragraph is present with regard to other reform methodologies in the same three courses. Often, two-year colleges have more in common with BA and MA institutions than these latter have in common with PhD institutions. Here are the percentage data, given on each line in the following order:

- Writing assignments in mainstream Calculus I: 31%, 45%, 20%, and 19% .
- Writing assignments in non-mainstream Calculus I: 20%, 11%, 19%, and 12%.
- Writing assignments in Elementary Statistics: 50%, 52%, 33%, and 22%.

- Computer assignments in mainstream Calculus I: 35%, 41%, 35%, and 23%.
- Computer assignments in non-mainstream Calculus I: 15%, 5%, 23%, and 10%.
- Computer assignments in Elementary Statistics: 46%, 44%, 55%, and 48%.
- Group projects in mainstream Calculus I: 27%, 33%, 18%, and 10%.
- Group projects in non-mainstream Calculus I: 20%, 8%, 8%, and 9%.
- Group projects in Elementary Statistics: 35%, 32%, 12%, and 14%.

TABLE TYR.10 Percentage of sections using different instructional methods by course in Mathematics Programs in two-year colleges: Fall 2000.

		Percentage of sections taught using							
Course number	Type of Course	Graphing calculators %	Writing assignments %	Computer assignments %	Group projects %	Weekly computer lab %	Standard lecture method %	Distance learning %	Number of sections
1	Arithmetic	3	5	12	11	19	69	0.7	5,425
2	Pre-algebra	5	10	12	14	17	84	1.5	3,561
3	Elementary algebra (HS)	20	12	12	14	14	78	1.3	11,173
4	Intermed algebra (HS)	31	13	8	16	8	79	1,8	9,378
5	Geometry (HS)	32	4	3	6	2	86	4.9	354
6	College algebra	74	21	11	16	5	83	6.7	6,619
7	Trigonometry	67	12	4	10	3	89	0.8	1,291
8	College algebra & trig	86	15	11	15	1	75	2.8	592
9	Intro math modeling	87	73	24	86	26	79	0.9	329
10	Precalculus[1]	83	22	16	20	8	86	1.6	1,991
11	Mnstrm calculus I	78	31	35	27	17	79	1.6	2,298
12	Mnstrm calculus II	74	25	37	25	16	80	2.4	957
13	Mnstrm calculus III	69	21	35	23	15	74	1.1	686
14	Non-mstrm calculus I	72	20	15	20	6	77	3.1	728
15	Non-mstrm calculus II	73	39	24	8	19	68	19.4	57
16	Differential equations	52	14	26	17	11	65	1.5	290
17	Linear algebra	69	29	40	24	19	83	3.7	177
18	Discrete mathematics	47	40	23	30	8	53	0	157
19	Elementary statistics	59	50	46	35	28	79	5.8	2,794
20	Probability	56	55	59	4	48	87	2	144
21	Finite mathematics	61	17	8	18	3	79	0.4	750
22	Math for liberal arts	20	41	15	32	5	79	5.5	1,668
23	Math for elem tchrs	28	66	21	58	2	65	1.4	810
24	Business math[2]	8	8	17	10	12	75	4.9	379
25	Business math[3]	44	6	3	4	1	86	0	298
26	Tech math (non-calc)	36	16	13	13	6	82	0	717
27	Tech math (calc)	49	9	12	9	7	93	0	100
28	Data processing	31	30	20	23	12	76	3.8	695
29	Computers & society	0	90	93	17	87	82	0	105
30	Intro to software	0	62	99	43	99	19	6.5	771
31	Issues in CS	0	6	100	100	100	100	0	47
32	Cmptr programming I	0	27	97	17	87	60	0	285
33	Cmptr programming II	0	43	86	12	57	77	3.3	87
34	Adv prgm & data str	0	47	100	5	59	76	0	52
35	Database mgmt	0	0	56	11	53	15	6.3	69
36	Discrete math for CS	66	33	21	33	21	100	0	13
37	Other CS courses	0	2	98	1	92	71	3.1	648
	Total all courses	**37**	**19**	**18**	**18**	**15**	**78**	**2.5**	**56,495**

[1] Includes Precalculus, Elementary functions, and Analytic geometry.
[2] Not transferable for credit toward a bachelors degree.
[3] Transferable for credit toward a bachelors degree.

TABLE TYR.11 Percentage and number of Calculus sections in Mathematics Programs at two-year colleges that assign group projects and that have a writing component: Fall 1990, 1995, and 2000.

		Percentage of sections with group projects			Percentage of sections with a writing component			Number of sections		
Course number	Type of course	1990	1995	2000	1990	1995	2000	1990	1995	2000
11	Mainstream Calculus I	4	22	27	5	20	31	2062	2325	2298
12	Mainstream Calculus II	3	18	25	4	13	25	1004	1008	957
13	Mainstream Calculus III	0	22	23	4	16	21	782	733	686
14	Non-mstrm Calculus I	5	20	20	4	17	20	1148	1010	728
15	Non-mstrm Calculus II	2	22	8	2	16	39	na	75	57

Services Available to Students

Chapter 2 of the current report contains a comparison of academic and other related services available to four-year students and to two-year students. See Tables AR.7 through AR.12 in that chapter. Table TYR.12 gives the percentage of two-year college mathematics programs that offered various services to students in fall 2000.

Placement Testing, Tutorial Laboratories, Outreach Projects, Independent Study, Honors Programs, Programs for Minorities, and Programs for Women

Diagnostic or placement testing and tutorial labs were almost universal in availability. Two of the new items included for the first time in the 2000 survey were outreach projects to K–12 schools and opportunities for independent study. Respectively, 20% and 25% of two-year schools reported these as available. Only 4% of two-year schools reported that undergraduate research opportunities in mathematics were available to their students.

There was a 3 percentage point growth in the availability of honors sections of mathematics courses, when fall 1995 is compared to fall 2000. But such honors courses were available in fall 2000 at only 20% of two-year colleges. On the negative side of the ledger, special programs to encourage minorities in mathematics, which were available in 11% of two-year colleges in fall 1995, fell to 4% in fall 2000. Similarly, programs to encourage women in mathematics, which existed in only 8% of two-year college mathematics programs in fall 1995, fell to 4% in fall 2000. As regards these last two comparisons, the numbers refer to formally organized efforts within the mathematics program, not to the personal efforts of faculty members.

Faculty Advisors

Most eye-catching in Table TYR.12 was the 50% (32 percentage point) *drop* in schools which offered mathematics advising to students by members of the mathematics faculty. The magnitude of this drop in an area so central to the academic process raises the question if the data for this item in the fall 2000 survey were suspect. For example, had respondents in large numbers misunderstood the question? As likely, however, this percentage drop reflected a systematic move among two-year colleges to locate academic advising within a student services unit where generically trained individuals offered academic counseling in all subject areas.

If by fall 2000 mathematics course advising had experienced a major move from mathematics programs to student service units within the colleges, anecdotal evidence suggests the rationale for the move might be as follows. Much of the mathematics faculty (almost 70%) was part-time, and hence the full-time faculty was stretched thin to cover advising. The student body itself was very fluid—part-time, drop-in/drop-out, night only, week-end, working, non-residential—and not readily available on campus when the relatively few full-time permanent faculty were present. Hence, offering advising through a student services unit, where it could be tied directly to diagnostic and placement testing, would make advising accessible to more students.

Anecdotally, mathematics faculty complain about the accuracy of the advice students receive from non-mathematicians working in generic advising units. They point out that placement of students into the proper first mathematics course, and the interrelation of all mathematics courses, is much more complex than it is, say, for freshman/sophomore courses in English composition or American history. A worthy object for future CBMS surveys would be to investigate what steps mathematics programs take to improve the advising offered by student service units and to investigate the overall effect on mathematics instruction when advising takes place outside the discipline.

TABLE TYR.12 Percentage of the 1,053 two-year colleges offering various opportunities and services to Mathematics students: Fall 2000.

Opportunity/Service	1995	2000
Diagnostic or placement testing	98	98
Mathematics lab or tutorial center	93	98
Advising by a member of the Mathematics faculty	65	33
Opportunities to compete in Mathematics contests	29	28
Honors sections	17	20
Mathematics club	14	14
Special Mathematics programs to encourage minorities	11	4
Lectures/colloquia for students, not part of Math club	9	9
Special Mathematics programs to encourage women	8	4
K-12 outreach opportunities	na	20
Undergraduate research opportunities	na	4
Independent Mathematics studies	na	25
Other	2	4

Mathematics Labs

In fall 2000, about 98% of two-year colleges with mathematics programs had a mathematics lab or tutorial center. Table TYR.13 shows the services available in these mathematics labs. Almost all labs offered tutoring by students, with the percentage of such labs jumping from 84% to 96% between 1995 and 2000. Media such as videotapes, computer-aided instruction, and computer software were important lab tools. Somewhat less than half the labs offered tutoring by faculty, either full-time or part-time. The mathematics labs increasingly were staffed by students and paraprofessionals. These latter are non-faculty staff who may not hold collegiate degrees or collegiate degrees beyond the bachelors.

TABLE TYR.13 Percentage of the 1,032 two-year colleges with a Mathematics lab or tutorial center that offer various services to students: Fall 2000.

	Percentage of two-year colleges with Math lab/ tutorial center that offer various services to students	
Services offered in Mathematics lab or tutorial center	1995	2000
Computer-aided instruction	69	68
Computer software such as computer algebra systems or statistical packages	65	69
Media such as videotapes	70	74
Tutoring by students	84	96
Tutoring by paraprofessionals	58	68
Tutoring by part-time Mathematics faculty	39	48
Tutoring by full-time Mathematics faculty	38	42
Internet access	na	53

TABLE TYR.14 Percentage of two-year colleges using various sources of personnel for Mathematics lab or tutorial center: Fall 1985, 1990, 1995, and 2000.

	Percentage of two-year colleges using source			
Source	1985	1990	1995	2000
Students	48	73	84	96
Full-time members of the Mathematics staff	38	46	38	42
Paraprofessionals	34	51	58	68
Part-time members of the Mathematics staff	30	32	39	48

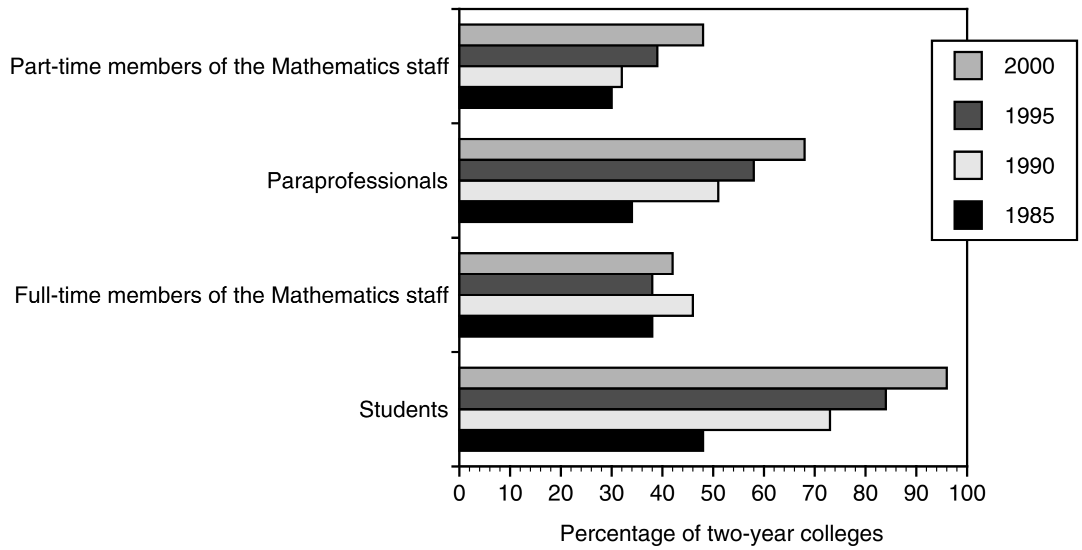

FIGURE TYR.14.1 Percentage of two-year colleges using various sources of personnel for Mathematics labs or tutoring centers: Fall 1985, 1990, 1995, and 2000.

Placement Into Courses

A comprehensive analysis across all institution types of the survey data on student placement into mathematics courses is given in Chapter 2 of the current report. See Tables AR.7 through AR.9. Some of the principal findings for two-year colleges are summarized in the next paragraph. On a comparative level, in fall 2000 two-year colleges were much more likely than four-year colleges or universities to require placement testing of their entering or first-time students (98% versus 49%) or to enforce mandatory course placement based on the test (67% to 47%). The gap also is large with regard to a required visit with an advisor before enrolling in a mathematics course: 79% at two-year colleges and 60% at four-year colleges.

Virtually all (98%, the same percentage as 1995) two-year colleges with mathematics programs had diagnostic or placement testing to help students decide which course to take, and 98% also *required* first-time enrollees to take a placement test. In 67% of two-year colleges (a drop of 7 percentage points from 1995), *placement* was mandatory. In 79% of two-year colleges, a student was required to speak with an advisor to discuss placement test results before registering for a first mathematics course. Locally written placement test materials were used in 99% of colleges while commercial tests came from American College Testing (ACT), the Educational Testing Service (ETS), and a variety of other test providers. The first two commercial sources were used, respectively, by 30% and 34% of two-year colleges. These last two percentages can be found in Table AR.9 in Chapter 2. Among two-year colleges, 85% reported periodic review of the effectiveness of their placement tests.

Mathematics Courses Taught Outside of Mathematics Programs

Two-year colleges have a long history of offering mathematics courses, especially developmental courses, in instructional units outside of the mathematics program. The pattern of this enrollment is affected by the institution's philosophy concerning developmental education: developmental students take all developmental courses (mathematics, reading, and writing) in a self-contained unit devoted to these students or developmental courses are offered as part of the disciplinary curriculum.

In 1970, the number of students enrolled in mathematics courses outside a mathematics program was 71,000 (not shown in Table TYR.15; see [CBMS, 1995, p. 103]). The percentages calculated below are based on this 1970 outside enrollment figure and give a long-lens historical perspective on the pattern of "outside" mathematics enrollment at two-year colleges.

For the twenty years after 1970, fueled mostly by enrollments in developmental courses outside of the mathematics programs, enrollments in "outside" mathematics courses grew dramatically. In 1990, they peaked at 181,000, a level that was 255% higher than in 1970. In 1995, they declined to 153,000, a level still 215% higher than 1970. In fall 2000, these "outside" enrollments declined again, reaching 118,000. This last decline represented a 35% shrinkage since the 1990 peak and a 23% shrinkage since 1995.

The reader again is cautioned to keep in mind two comments provided early in this chapter on how computer science enrollments *outside* of mathematics were reported in CBMS surveys prior to 1995 and how they are reported in 1995 and 2000. No computer science courses taught *outside* the mathematics program are included in Table TYR.16. Computing courses taught *within* mathematics programs are clearly labeled in Tables TYR.3 and 4 but are *not* included in TYR.2.

Within mathematics programs, enrollment in mathematics courses (including statistics; see TYR.2) from 1970 to 1990 grew 227%, somewhat less than the 255% enrollment growth in mathematics courses *outside* mathematics programs. In contrast, outside enrollment had fallen 35% since 1990, but *inside* enrollment in fall 2000 remained 4% higher than its 1990 level, despite an overall decline in mathematics enrollment from 1995 to 2000. Significantly, 71% of the outside enrollment drop recorded in Table TYR.15 was accounted for by two courses: Arithmetic and Elementary Algebra. Another 23% (total: 94%) of the outside enrollment drop is accounted for by two business mathematics courses.

Decline in Enrollment in Basic Skills Courses Outside Mathematics Programs

One can only conjecture the reasons for the large drop in outside arithmetic and elementary algebra enrollment noted in fall 2000. Since there was a 5% decline in "inside" mathematics program enrollment in these courses during the 1995 to 2000 period, the enrollment in these outside courses did not gravitate to mathematics programs. It is possible that fewer entering students needed these courses. Another possibility is that student instruction in this content was handled more often in a non-course setting, for example, via a computer tutorial, and no longer showed up in course enrollment figures. A third reason could be a restructuring of these developmental courses so that they were no longer classified as "Arithmetic" and "Elementary Algebra."

In the end, the most likely explanation is that this enrollment drop in outside arithmetic and elementary algebra courses simply paralleled the drop in mathematics program enrollment discussed earlier in this chapter and in Chapter 1. If so, however, the question remains why so large an enrollment drop took place in very beginning basic skills courses outside the mathematics program.

TABLE TYR.15 Estimated enrollment (in 1000s) in Mathematics and Statistics courses taught outside of Mathematics Programs at two-year colleges: Fall 1975, 1980, 1985, 1990, 1995, and 2000.

	Enrollment (in 1000s)					
Type of course	1975	1980	1985	1990	1995	2000
Arithmetic/Pre-algebra	27	18	18	42	54	43
Elementary algebra (HS level)	na	na	na	38	41	27
Intermediate algebra (HS level)	na	na	na	27	10	10
College algebra	na	na	na	6	2	1
Trigonometry/Precalculus (college)	17	29	3	3	1	0
Calculus or Differential equations	4	8	0	4	1	0
Business mathematics	53	70	50	32	26	18
Statistics & probability	14	12	7	15	9	7
Technical mathematics	na	25	23	10	8	5
Other	12	10	4	4	1	7
Total	**127**	**172**	**105**	**181**	**153**	**118**

Note: 0 means less than 500 enrollments.

Organization of Mathematics Courses Outside the Mathematics Program

With respect to the organization of mathematics courses outside the mathematics program in fall 2000, 68% of the outside enrollments were in remedial courses taught either in a learning lab or in another department such as a developmental studies division. Most of the rest of the outside enrollment was in (non-transferable) business mathematics taught in a business division, an enrollment that also fell noticeably in fall 2000.

Tables TYR.15 and TYR.16 give the enrollments in mathematics courses that were offered *outside* of mathematics programs. These enrollments were estimated by mathematics program heads. Thus, they may not be as accurate as the numbers given for enrollment *within* mathematics programs.

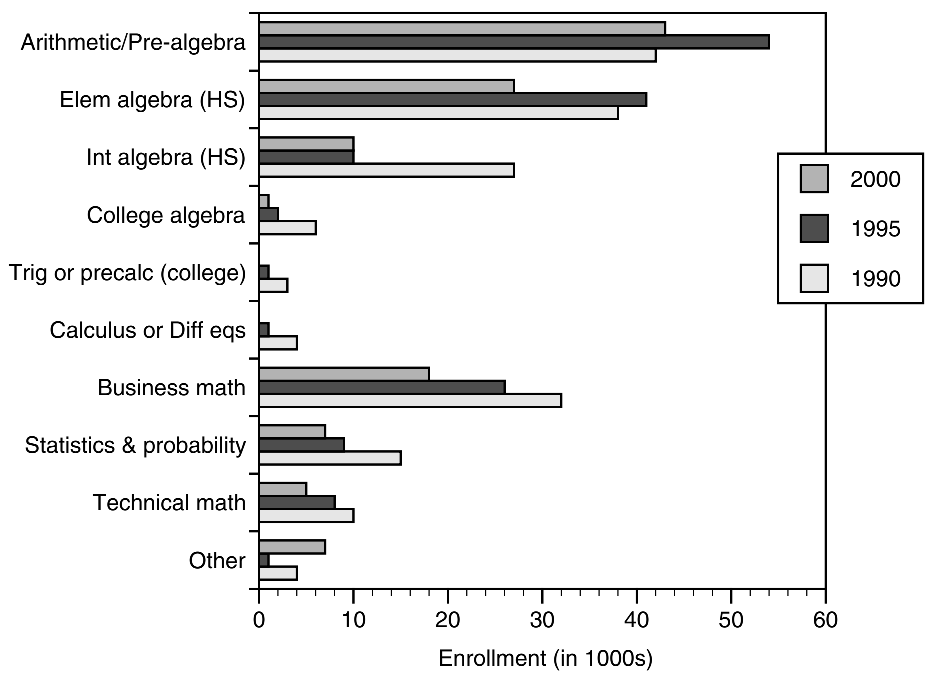

FIGURE TYR.15.1 Estimated enrollment (in 1000s) in Mathematics and Statistics courses taught outside of Mathematics Programs at two-year colleges: Fall 1990, 1995, and 2000.

TABLE TYR.16 Estimated enrollment (in 1000s) in Mathematics courses taught outside of Mathematics Programs at two-year colleges by division where taught: Fall 2000.

	Mathematics Enrollment (in 1000s) in Other Programs							
Course	Natural Sciences	Occupational Programs	Business	Social Sciences	Learning Center	Computer Science	Other Depts/ Divisions	**Total**
Arithmetic/Pre-algebra	0	0	1	0	8	0	33	**43**
Elem algebra (HS)	0	0	0	0	4	0	23	**27**
Intermed algebra (HS)	0	0	0	0	2	0	8	**10**
College algebra	0	0	0	0	0	0	1	**1**
Trig or Precalc (college)	0	0	0	0	0	0	0	**0**
Calculus or Diff equations	0	0	0	0	0	0	0	**0**
Business mathematics	0	0	17	0	0	0	1	**18**
Statistics & probability	0	0	5	1	0	0	1	**7**
Technical mathematics	0	4	0	0	0	0	1	**5**
Other	0	2	0	0	0	3	1	**7**
Total	**0**	**7**	**24**	**1**	**14**	**3**	**67**	**118**

Note: 0 means less than 500 enrollments, and this causes row and column sum inconsistencies in Table TYR.16.

The Supervision of Dual Enrollment Courses

In fall 2000, so-called dual enrollment courses were a growing phenomenon which affected two-year college mathematics programs. These courses generally earned credit both for high school graduation and at the two-year institution. In most cases, these courses were *not* outside the mathematics program in the technical sense of this CBMS survey. They had some level of supervision from the mathematics program, and most mathematics programs counted them among the courses offered by the program. However, these courses often were at the far edge of mathematics program supervision since they often were taught by the regular high school mathematics faculty who were hired and paid by the high school district.

Dual enrollment was one of the special topics studied in the CBMS2000 survey and is analyzed in Chapter 2 of the current report. See the DEN tables in that chapter, which are devoted to dual enrollment, especially DEN.16 through 18, and the discussion which accompanies the tables. Additional reference to dual enrollment, with regard to credentials and supervision of those who teach such courses, can be found in Chapter 7.