

## Chapter 7

# Faculty, Administration, and Special Topics in Mathematics Programs at Two-Year Colleges

This chapter continues the presentation of data and analysis about mathematics programs in public two-year colleges. It reports the number, teaching conditions, education, professional activities, age, gender, and ethnicity of the faculty in these mathematics programs in fall 2005. Also included is information on mobility into, within, and out of two-year college mathematics program teaching positions. Additional analysis of the items discussed in this chapter can be found in Chapters 1 and 2 where they are discussed from a comprehensive point of view in comparison to similar data for four-year colleges and universities. In particular, Chapter 2 discusses issues related to dual-enrollment courses and pre-service teacher training.

The data are compared with those from the 1975, 1980, 1985, 1990, 1995, and 2000 CBMS surveys. Unlike surveys prior to 1995, the mathematics faculty surveyed in 1995, 2000, and 2005 did not include faculty who taught in computer science programs that were separate from mathematics programs. Also, in contrast to previous surveys, the data is drawn from a survey of public two-year colleges only. A more detailed statement on these issues occurs at the beginning of Chapter 6. Information on the sampling procedure used in the 2005 survey can be found in Appendix II. A copy of the two-year college survey questionnaire for CBMS2005 can be found in Appendix V.

The term “permanent full-time” is used frequently below. Faculty members in this category at two-year colleges have an on-going stable relationship to the mathematics program similar to that of tenured and tenure-track faculty at four-year institutions. They occupy a recurring slot in the college’s budget and are subject to the college’s long-term evaluation and reappointment policies. They are the group of faculty primarily responsible for curriculum development, student advising, committee appointments, and other forms of college service. Full-time faculty who are not permanent are called “temporary full-time faculty.”

The term “tenure” is not used because the majority of two-year colleges do not have traditional tenure systems, and the use of the word “tenure” in the survey questionnaire would have been confusing to respondents. At the majority of two-year colleges, faculty stability is embodied in a sequence of recurring contracts or appointments typically running from three

to five years. Permanent full-time faculty members teach full course assignments, which distinguishes them from part-time or adjunct faculty. They also are distinguished from “temporary” full-time faculty who are meeting a short-term institutional need and do not participate in the college’s on-going reappointment process.

The Table display code in this chapter is TYF, for “two-year faculty,” since the chapter deals mostly with issues related to faculty.

### Highlights of Chapter 7

- There were almost 8,800 permanent full-time faculty in public two-year college mathematics programs in the United States in fall 2005, a 26% increase from 2000 that strongly reversed the 8% decline that occurred between 1995 and 2000. Another 609 individuals were teaching as temporary full-time faculty, a 63% decrease from 2000 in those occupying temporary status and a sharp change from the 600% increase in temporary full-time faculty that occurred between 1995 and 2000. See Table TYF.1.
- Once again, in fall 2005 the number of part-time faculty in two-year college mathematics programs doubled the number of full-time faculty. Part-time faculty, if those paid by third parties such as school districts are included, made up 68% of the total faculty. When third party payees are omitted, part-time faculty made up 66% of the faculty. In 2000, this last percentage was 65%. About 44% of all sections were taught by part-time faculty members, a two-point drop from 2000. See Tables TYF.1 in this chapter and TYE.9 in Chapter 6.
- In light of the previous bullet, the data suggest that the large enrollment increase in mathematics and statistics that occurred in public two-year colleges from 2000 to 2005 was accompanied by a proportional growth in permanent full-time faculty and was not accommodated by employing a disproportional number of part-time faculty members. On enrollment, see Table TYE.2 in Chapter 6 and Table S.1 in Chapter 1.
- However, one should note that 53% of permanent full-time faculty in fall 2005 taught extra hours

for extra pay at their own college, little changed from the 52% reported in 2000. The average “extra” assignment for these faculty members was slightly more than one three-credit course, namely, 3.6 classroom contact hours weekly. This extra work accounted for about 4700 class sections, classified as being taught by full-time faculty, that otherwise would have required additional part-time staffing and would have raised the percentage of sections taught by part-time faculty to 50%. See Tables TYF.2 in this chapter and TYE.9 in Chapter 6.

- The average teaching assignment for permanent full-time faculty in classroom contact hours per week increased 3% in fall 2005 in comparison to fall 2000, from 14.8 hours to 15.3 hours. See Table TYF.2.
- In fall 2005, a masters degree was the terminal degree for 82% of permanent full-time mathematics faculty members at two-year colleges, up one point from 2000. An additional 16% held doctorates. In fall 2000, in a large and troubling increase, 19% of newly-hired permanent full-time faculty members were reported as holding only bachelors degrees. In 2005, this percentage for newly-hired faculty fell back sharply to 5%, but was still higher than the 1% reported in 1995. See Tables TYF.4, TYF.5, and TYF.19.
- Among part-time faculty in fall 2005, 22% had a bachelors degree as their highest degree, a status generally allowed by accrediting agencies for those who teach only precollege (remedial) courses. Among all degree types, 21% of part-time faculty had majors outside of mathematics, mathematics education, or statistics. See Tables TYF.6 and TYF.7.
- For the first time in a CBMS survey, the proportion of men and women among the permanent full-time faculty was exactly equal at 50%. Women made up 47% of the part-time faculty. See Tables TYF.8 and TYF.9.
- About 14% of permanent full-time faculty members in mathematics programs in fall 2005 were ethnic minorities, up slightly from the 13% reported in 2000. Ethnic minorities made up a higher proportion (23%) of the under-age-40 faculty than they did of the faculty as a whole. The percentage split between White (non-Hispanic) faculty and ethnic minority faculty almost exactly reflected the corresponding split for masters degrees awarded in mathematics and statistics in the United States in 2003–2004. See Tables TYF.10, TYF.11, TYF.12, and TYF.13.
- Among newly-hired permanent full-time faculty in fall 2005, 20% were ethnic minorities and 53% were women. See Table TYF.20.
- Among part-time faculty, 16% were ethnic minorities in fall 2005. See Tables TYF.14 and TYF.15.
- Distribution of faculty by age in fall 2005 was essentially identical to that in 2000, with 28% of the permanent full-time faculty over age 55 and 46% over age 50. The average age was 47.8. See Tables TYF.16 and TYF.17 in this chapter and Table S.18 in Chapter 1.
- There was a notable change in fall 2005 in the selection pattern for the 605 newly-hired permanent full-time faculty members. The percentage hired from graduate school jumped from 8% in 2000 (when the base was 572) to 23%, almost one-quarter of the new permanent full-time faculty hires. Additionally, 18% of these new full-time faculty arrived from teaching jobs at four-year institutions, up from 8%. Those hired from high school dropped to 13%, a decline of nine points. See Tables TYF.18 and TYF.19.
- Of the new hires in fall 2005, 22% were under age 30, 42% were under age 35, and 59% were under age 40. See Table TYF.21.
- Ready availability of computers or terminals continued to be a difficulty in fall 2005 for part-time faculty, with only 63% of institutions reporting these tools were in part-time faculty offices. In fall 2000, the CBMS survey reported essentially 100% availability in full-time faculty offices. Desk sharing remained common among part-time faculty, with sharing among three or more individuals reported in 65% of cases. See Tables TYF.23 and TYF.24.
- Unexpectedly, in fall 2005 the percentage of two-year colleges requiring periodic teaching evaluations for all full-time faculty members dropped from 98% to 89%. However, there was a jump in the percentage of colleges that used classroom visitation by an administrator as a part of the evaluation of full-time faculty members. See Tables TYF.25 and TYF.26.
- The percentage of two-year colleges requiring annual continuing education or professional development for permanent full-time faculty rose to 55%, up from 38% in 2000 and 20% in 1995.
- The three items reported by the highest percentage of mathematics program heads as being a major problem were (i) too many students needing remediation (63%), (ii) students not understanding the demands of college work (55%), and (iii) low student motivation (50%). When the “somewhat of a problem” category is included, the percentages for these items (in the same order) were 91%, 90%, and 81% of colleges. Too many students needing remediation and low student motivation also were at the top of the problems list in 2000. See Tables TYF.28 and TYF.29.

- In fall 2005, a traditional mathematics department was found in fewer than half (41%) of the two-year colleges. Only 2% of these were multi-campus departmental arrangements. A combined mathematics/science department or division was the management structure at 36% of institutions. See Table TYF.30.
- Reflecting an expanded role for two-year colleges in teacher preparation, especially at the elementary school level, 38% of institutions assigned a mathematics faculty member to coordinate K–8 teacher education in mathematics, up from 22% in 2000. In what appears to be a new development, pre-service teachers could complete their entire mathematics course requirement at the two-year college in 30% of institutions. See Special Topics in Chapter 2, Tables SP.2 and SP.4.
- As reported in Chapter 6, about 42,000 students were dually enrolled in fall 2005 in a two-year college mathematics course that gave credit at both the high school and at the college. Such courses were taught on a high school campus by a high school faculty member. The academic control of such courses ranged from 89% of two-year college mathematics programs reporting they always approved the syllabus to 74% that they always chose the textbook. But only 52% said they controlled the choice of instructor, and only 37% reported control over the design of the final exam. In only 64% of cases was the usual department faculty teaching evaluation required in the dual-enrollment course. See Table SP.16 in Chapter 2.
- As noted in Chapter 6, with respect to the organization of mathematics instruction within two-year colleges, 31% of two-year colleges in fall 2005 reported some of their precollege (remedial) mathematics courses were administered separately from the mathematics program. This percentage was two points higher than the 29% reported in 2000. See Table TYE.17 in Chapter 6.

### **The Number and Teaching Assignments of Full-time and Part-time Mathematics Program Faculty**

#### **Number of permanent full-time faculty and part-time faculty**

In fall 2005, the number of permanent full-time mathematics faculty at two-year colleges resumed the growth trend that had characterized every year from 1980 to 1995. There was a one-time 8% decline in permanent full-time faculty between 1995 and 2000. The growth from 2000 to 2005 was an eye-catching 26%, making the size of the permanent full-time faculty a record 8,793.

Another 609 individuals were reported as temporary full-time faculty, a 63% decrease in a category that had taken a worrisome 600% rise from 1995 to 2000. The strong movement to permanent full-time faculty that appeared in fall 2005 paralleled the large enrollment growth that occurred from 2000 to 2005. See Chapter 6 for two-year college enrollment data and the overall enrollment data summary in Chapter 1.

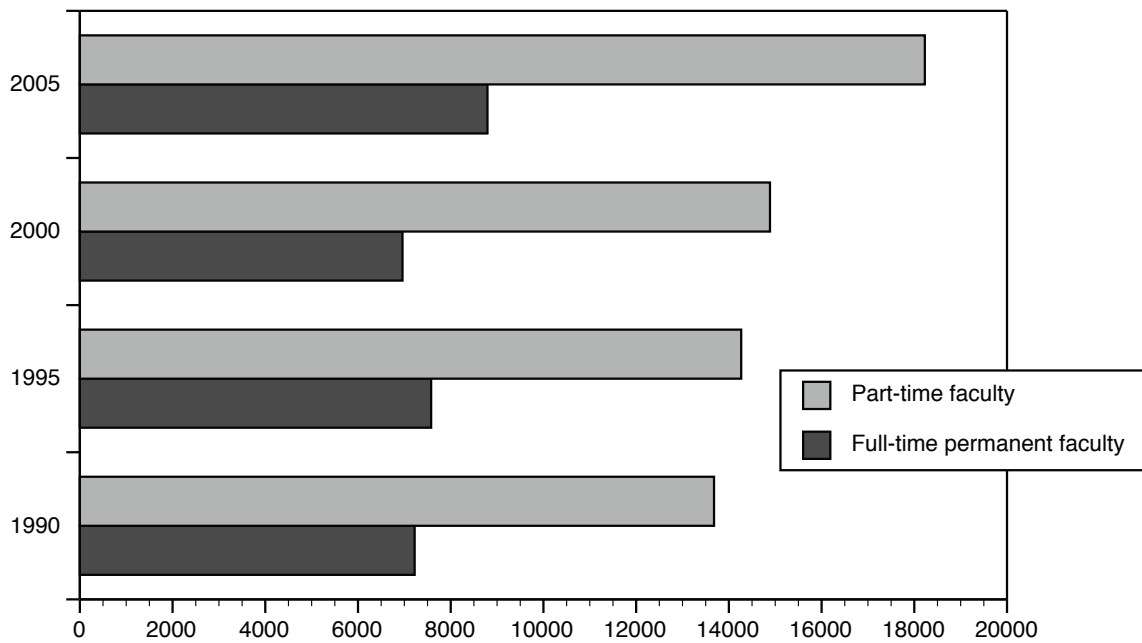
Part-time faculty members fell into two categories. Most were paid by the college. Some were paid by a third party. These latter most often were high school teachers in a school with which the college had a dual-enrollment agreement. (Dual enrollment is discussed later in this chapter and comprehensively in Chapter 2.) When both categories are included, part-time faculty numbered 20,142 or 68% of the total two-year college teaching staff. When third party payees are excluded, part-time faculty members were about 66% of total faculty, a percentage almost identical to the 65% reported in 2000.

#### **Teaching assignment of permanent full-time and part-time faculty**

The average required teaching assignment in weekly classroom contact hours for a permanent full-time mathematics faculty member at a public two-year college rose slightly in fall 2005 to 15.3 weekly

**TABLE TYF.1** Number of full-time permanent and full-time temporary faculty, and number of part-time faculty paid by two-year colleges (TYC) and by a third party (e.g., dual-enrollment instructors), in mathematics programs at two-year colleges in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

Two-Year Colleges	1990	1995	2000	2005
Full-time permanent faculty	7222	7578	6960	8793
Full-time temporary faculty	na	164	961	609
Part-time faculty paid by TYC	13680	14266	14887	18227
Part-time, paid by third party	na	na	776	1915



**FIGURE TYF.1.1** Number of full-time permanent faculty and part-time faculty in mathematics programs in two-year colleges in fall 1990, 1995, 2000, and 2005. (Data for 2005 include public two-year colleges only.)

contact hours. This continued a twenty-year period of oscillation. In 2000 the average weekly contact hour assignment had been 14.8, but in 1995 it was reported as 15.8. In 1990, the number was 14.7 hours, but in 1985 it had been 16.1 hours.

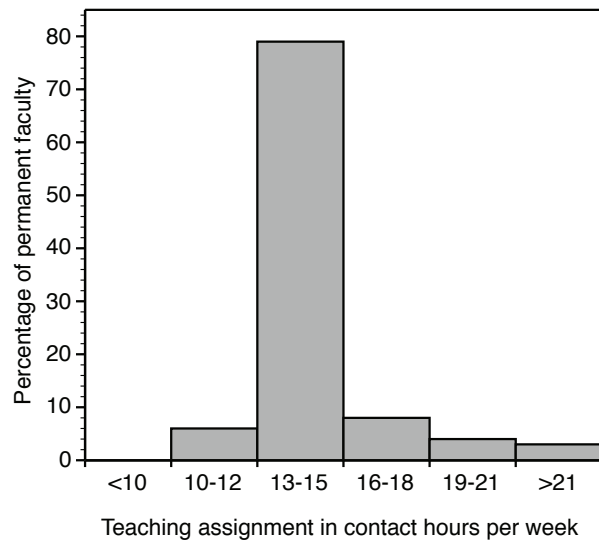
About 80% of colleges had a teaching requirement for full-time faculty between 13 and 15 weekly contact hours. About 15% had higher weekly contact hour teaching assignments. Only 5% had teaching assignments below 13 weekly contact hours.

See Table TYF.2 for the following fall 2005 data. About 57% of part-time faculty members in two-year college mathematics programs taught six credit hours or more. This was up three percentage points

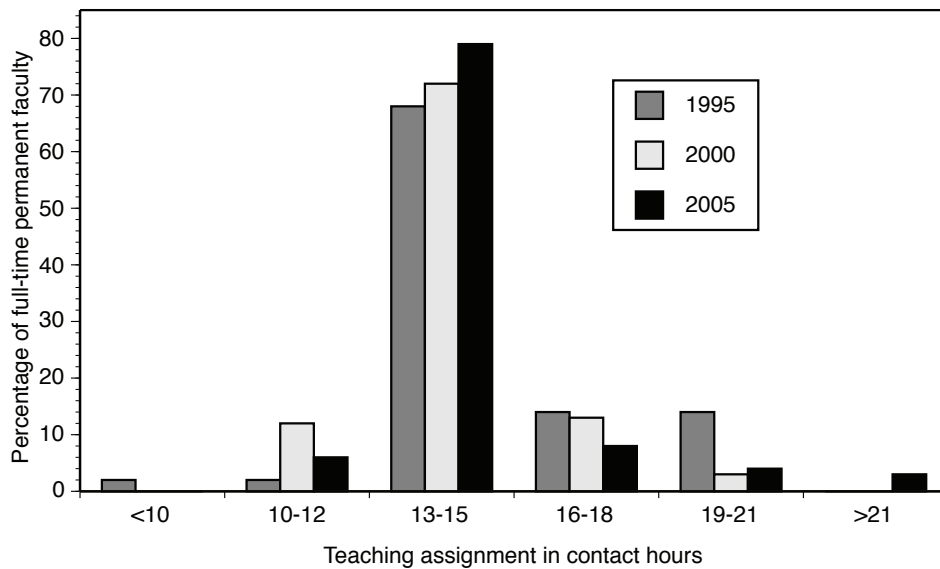
from 2000. Office hours were required of part-time faculty in 37% of two-year colleges, exactly the same percentage as in 2000. The fall 2005 CBMS survey showed 54% of part-time faculty members were paid on the same pay scale as that for the extra-hours teaching of full-time faculty members. This percentage was noticeably lower than the 71% reported for fall 2000 and closer to the 60% reported in 1995. In fall 2005, 5% of colleges paid part-timers more, and 42% paid less, than full-time faculty were paid for extra courses. In fall 2000, these percentages were 2% and 27% respectively.

**TABLE TYF.2** Teaching assignment for full-time permanent faculty, and teaching and other duties of part-time faculty, in mathematics programs at two-year colleges in fall 2005 with 2000 data in parentheses. (Data for 2005 include only public two-year colleges.)

Teaching assignment in contact hours	<10	10 to 12	13 to 15	16 to 18	19 to 21	>21
Percentage of two-year colleges	0 (0)	6 (12)	79 (72)	8 (13)	4 (3)	3 (0)
Average contact hours for full-time permanent faculty: 15.3 (14.8)						
Percentage of the full-time permanent mathematics faculty who teach extra hours for extra pay at their own two-year college: 53% (52%)						
Average number of extra hours for extra pay: 3.6 (3.6)						
Percentage of full-time permanent mathematics faculty who teach additional hours at another school: 7.6% (6%)						
Percentage of part-time faculty who teach 6 or more hours weekly: 57%						
Percentage of two-year colleges requiring part-time faculty to hold office hours: 37%						
Pay scale for full-time faculty teaching extra hours for extra pay						
	<u>Same</u>	<u>Part-time paid more</u>	<u>Part-time paid less</u>			
Pay scale for part-time faculty	54%	5%	42%			



**FIGURE TYF.2.1** Percentage of full-time permanent faculty having various teaching assignments in mathematics programs at public two-year colleges in fall 2005.



**FIGURE TYF.2.2** Percentage of full-time permanent faculty with various teaching assignments in mathematics programs at two-year colleges in fall 1995, 2000, and 2005. (Data for fall 2005 include only public two-year colleges.)

**Extra teaching by full-time faculty**

Table TYF.2 shows that 53% of permanent full-time mathematics faculty members at two-year colleges taught extra hours for extra pay at their own colleges. This figure is essentially identical to the percentage in 2000, up only one percentage point. Almost 8% of permanent full-time faculty taught at other colleges, up two points from 2000. The average number of extra hours for extra pay taught by these full-time faculty members at their own colleges was 3.6, identical to the corresponding number in both 2000 and 1995.

As a fifteen-year trend, the percentage of permanent full-time mathematics faculty teaching extra courses for extra pay at their own colleges is up. From a 48% base in 1995, this percentage rose four points to 52% in 2000 and another point in 2005 to 53%.

The extra teaching for extra pay by permanent full-time faculty in fall 2005 accounted for about 4700 mathematics program class sections. These sections were classified as being taught by full-time faculty. Had it been necessary to find part-time faculty to teach these sections, the percentage of sections taught by part-time faculty in fall 2005 would have risen from about 44% to about 50%.

**Other occupations of part-time faculty**

In fall 2005, about 49% of part-time mathematics faculty members at two-year colleges were not employed full-time elsewhere and were not graduate students, up from 41% in 2000. In 1995, the percentage was 35%, and in 1990 and 1985 these percentages, respectively, were 27% and 21%. There is a clear trend in two-year college mathematics programs toward part-time faculty whose only employment is this teaching.

The percentage of part-time faculty who were employed full-time in a high school remained constant at 25%, after a steady decline from 37% in 1985, 30% in 1990, 28% in 1995, and finally to 25% in 2000 and 2005. This pattern reflects one of the most interesting historical trends in two-year college mathematics instruction. In the formative years of two-year colleges in the late 1960s, both full-time and part-time mathematics faculty were drawn in large numbers from secondary schools, in part because many secondary school faculty had earned the required masters degree in National Defense Education Act (NDEA) summer programs in the 1960s. This phenomenon (a decline in secondary schools as a source for two-year college mathematics faculty) also is reflected in Table TYF.18, which shows sources of newly appointed permanent full-time faculty in fall 2005.

**TABLE TYF.3** Percentage of part-time faculty in mathematics programs at two-year colleges having various other occupations in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

	Percentage of part-time faculty	
	2000	2005
<b>Other occupations of part-time faculty</b>		
Employed full-time in:		
a high school	25	25
another two-year college	2	2
another department at the same college	7	5
a four-year college	2	2
industry or other	20	14
Graduate student	3	3
No full-time employment and not a graduate student	41	49
<b>Number of part-time faculty</b>	<b>100%</b> <b>14887</b>	<b>100%</b> <b>18227</b>

### Educational Credentials of Faculty in Mathematics Programs

#### Highest degree of permanent full-time faculty

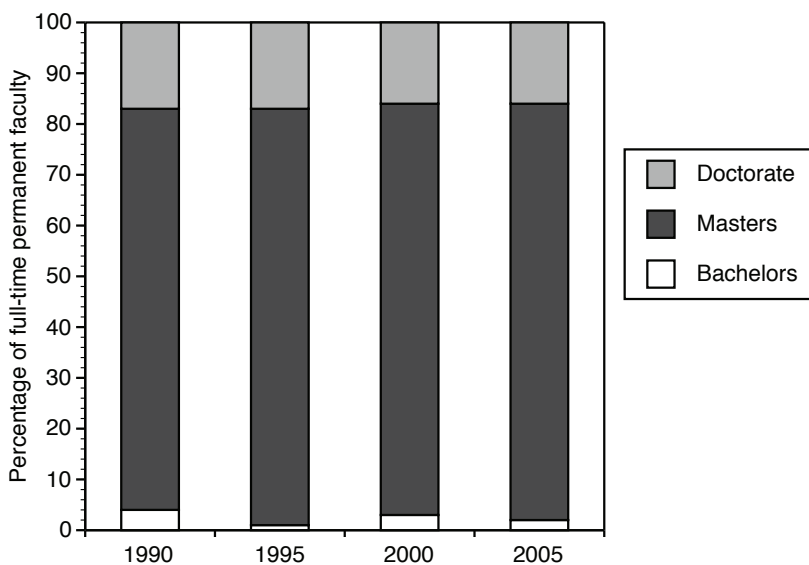
Table TYF.4 records that a masters degree was the terminal degree for 82% of permanent full-time mathematics faculty at two-year colleges, a percentage that has been essentially unchanged for 15 or more years. The percentage of faculty with a doctorate remained constant at 16%. The percentage of these faculty whose terminal degree was a bachelors dropped from 3% to 2%, most likely as a result of credential enforcement by accrediting agencies and of very different patterns in hiring new faculty than were present in 2000. As

for the degrees of new hires in fall 2005, see Table TYF.19 and the additional discussion there.

Table TYF.5 gives the academic major of the highest degree of permanent full-time two-year college mathematics faculty. Table TYR.21 in the CBMS2000 report gives analogous data for fall 2000. Overall, the proportion of the faculty with a masters or doctorate whose major field was mathematics rose eight points to 70%. The percentage of the faculty whose most advanced degree included a major in mathematics education dropped six points to 18%, with four points of the drop at the masters level. The percentage of degrees with majors in statistics or other fields remained essentially constant.

**TABLE TYF.4** Percentage of full-time permanent faculty in mathematics programs at two-year colleges by highest degree in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

Highest degree	Percentage of full-time permanent faculty			
	1990	1995	2000	2005
Doctorate	17	17	16	16
Masters	79	82	81	82
Bachelors	4	1	3	2
<b>Number of full-time permanent faculty</b>	<b>100%</b> <b>7222</b>	<b>100%</b> <b>7578</b>	<b>100%</b> <b>6960</b>	<b>100%</b> <b>8793</b>



**FIGURE TYF.4.1** Percentage of full-time permanent faculty in mathematics programs at two-year colleges by highest degree in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)



**TABLE TYF.5** Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by field and highest degree, in fall 2005.

Field	Percentage having as highest degree			Total
	Doctorate	Masters	Bachelors	
Mathematics	8	61	1	<b>70%</b>
Statistics	0	2	0	<b>2%</b>
Mathematics Education	4	14	0	<b>18%</b>
Other fields	3	5	1	<b>9%</b>
Total	16	82	2	<b>100%</b>

Note: 0 means less than half of 1% and round-off may make column sums seem inaccurate

#### Highest degree of part-time faculty

Tables TYF.6 and TYF.7 summarize data on the highest degrees held by part-time faculty members and on their fields of specialization. In fall 2005, a doctoral degree was the highest degree held by 6% of part-time faculty, the same percentage as fall 2000. A masters degree was highest for 72%, up two percentage points from 2000. A bachelors was the highest degree for 22%, down two percentage points from fall 2000. The percentage of part-time faculty with only bachelors degrees was 27% in 1990, but fell to 18% in 1995 and then rose to 24% in 2000. The turn in fall 2005 again is downward, if only slightly. Generally, accrediting agencies permit faculty who teach only precollege (remedial) courses to hold a bachelors as the highest degree.

In fall 2005, the percentage of part-time faculty whose most advanced degree included mathematics or mathematics education as the major field of study rose a combined five percentage points, from 71% in

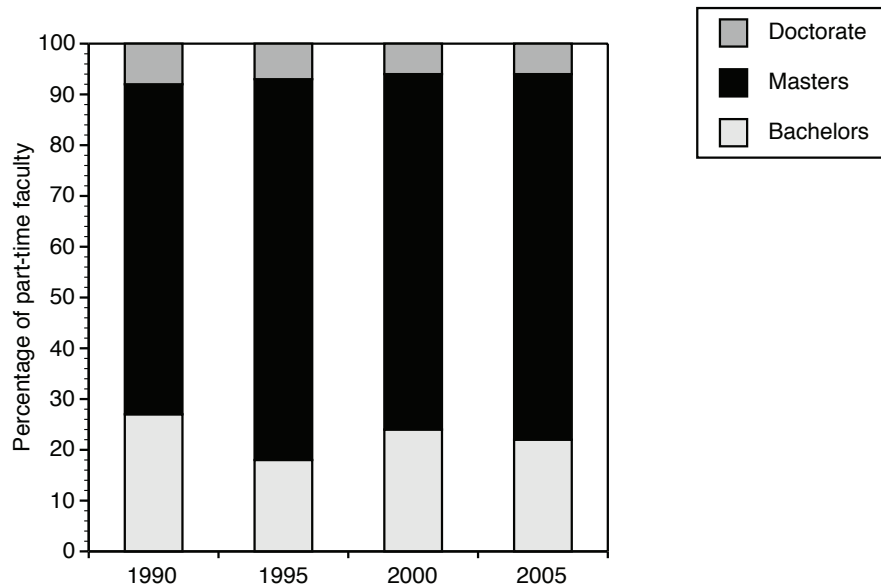
2000 to 76% in 2005. All but one point of this gain was at the expense of "other" fields (excluding statistics). See Table TYF.7.

In 2000, the CBMS survey reported that there had been a ten percentage point decline from 1995 in the percentage of masters-level mathematics program faculty holding degrees in mathematics, and a five percentage point increase in bachelors-level faculty who held their degrees outside of the mathematical sciences. It was suggested in 2000 that these trends deserved monitoring. Happily, in 2005, the proportion of masters degrees in mathematics is up three points and the proportion of bachelors degrees outside of mathematical sciences is down four points.

In 1995, 58% of all part-time faculty members in two-year college mathematics programs held their highest degree (Ph.D., MA, or BA) in mathematics. In 2000, the percentage had dropped to 45%. Again, as part of an increase in overall faculty preparedness, in 2005 that figure is back up to 49%.

**TABLE TYF.6** Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual enrollment courses) by highest degree, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

Highest degree	Percentage of part-time faculty			
	1990	1995	2000	2005
Doctorate	8	7	6	6
Masters	65	76	70	72
Bachelors	27	18	24	22
<b>Number of part-time faculty</b>	<b>100%</b> <b>13680</b>	<b>100%</b> <b>14266</b>	<b>100%</b> <b>14887</b>	<b>100%</b> <b>20142</b>



**FIGURE TYF.6.1** Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual enrollment courses) by highest degree in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

**TABLE TYF.7** Percentage of part-time faculty in mathematics programs at two-year colleges (including those paid by a third party, as in dual enrollments) by field and highest degree, in fall 2005, with 2000 data in parentheses. (Data for 2005 include only public two-year colleges.)

Field	Percentage having as highest degree			Total
	Doctorate	Masters	Bachelors	
Mathematics	2	36	11	<b>49%</b>
Mathematics Education	1	20	7	<b>27%</b>
Statistics	0	2	0	<b>3%</b>
Other fields	3	14	4	<b>21%</b>
Total	6 (6)	72 (70)	22 (24)	<b>100%</b>

Note: 0 means less than half of 1% and round-off may make row totals seem inaccurate.

### Gender, Ethnic Composition, and Age of Permanent Full-time Mathematics Program Faculty

#### Gender of permanent full-time faculty and part-time faculty

An increase in the percentage of women among permanent full-time mathematics faculty at two-year colleges has been reported in every CBMS study since 1975. In fall 2000, the percentage of women faculty reached 49%. In fall 2005, 50% of permanent full-time mathematics faculty members at the nation's public two-year colleges were women. This proportion of women among permanent full-time faculty was noticeably higher than the percentage of women (44%) among U.S. citizen/resident alien mathematics masters degree recipients in 2003–2004, the last year for which firm data were available. See Table TYF.9.

Table TYF.9 also reports that in fall 2005, the percentage of women among part-time faculty was 47%. This was up from 43% in fall 2000.

CBMS2000 had pointed out that it might be difficult over the long term to maintain the equal split of men and women among the two-year college permanent full-time mathematics faculty since in that year the proportion of women in the under-40 age group only was 45%, less than their representation in the entire permanent full-time faculty. Alleviating this concern,

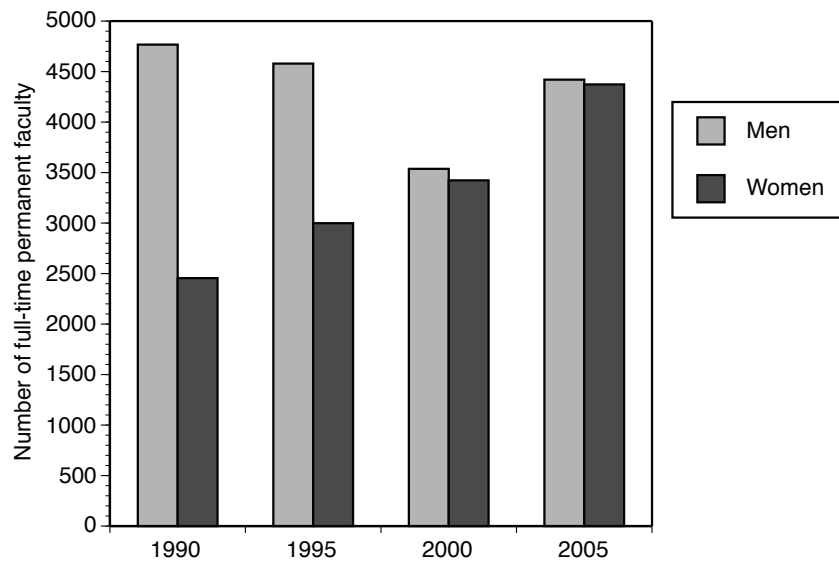
in fall 2005, the proportion of women in the under-40 age group rose to 49%. See the data in Table S.17 in Chapter 1, where the reader can find a comprehensive review of mathematics faculty gender patterns at institutions of all levels, two-year and four-year. As regards two-year colleges, also see Table TYF.17 in this chapter.

In fall 2000, the percentage of women among newly-hired permanent full-time mathematics faculty was 42%, another factor that seemed to threaten the long-term trend toward gender equality. But by fall 2005, the percentage of women among new hires had risen to 53%. See Table TYF.20.

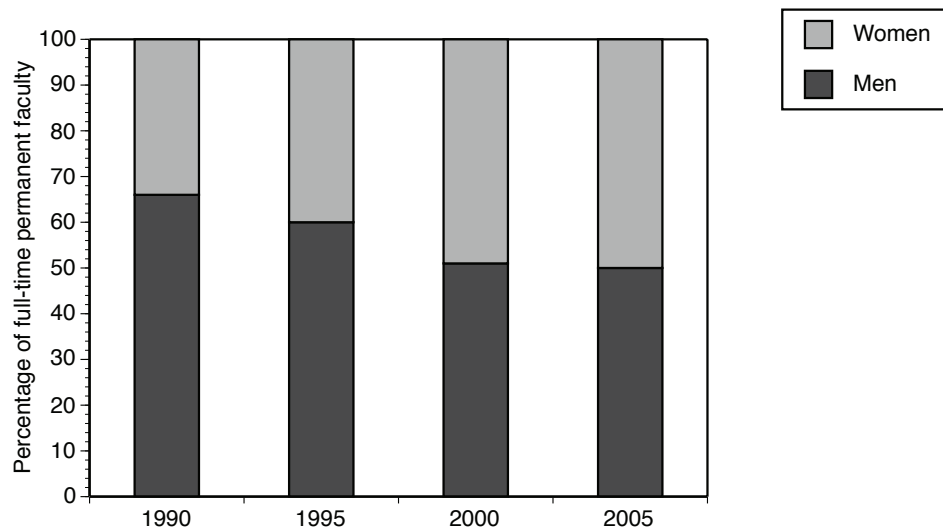
Here is some information from an historical perspective about the participation of women in mathematics at the masters degree level that further emphasizes their high faculty level at two-year colleges. In each CBMS report from 1970 to 1985, the percentage of women among mathematics masters degree recipients in the United States was reported as 35% or less. In 1995, based on NCES data for 1992–1993, CBMS reported the percentage of women mathematics masters degree recipients as 41%. That was the same figure NCES reported for 1997–1998 and also reported in CBMS2000. The percentage of U.S. masters degrees among women in fall 2000 was 44%. Yet in fall 2005, women made up 50% of the permanent full-time mathematics faculty at two-year colleges.

**TABLE TYF.8** Number and percentage of full-time permanent faculty in mathematics programs at two-year colleges by gender, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

	1990	1995	2000	2005
Men	4767 (66%)	4579 (60%)	3537 (51%)	4420 (50%)
Women	2455 (34%)	2999 (40%)	3423 (49%)	4373 (50%)
<b>Total</b>	<b>7222</b> <b>(100%)</b>	<b>7578</b> <b>(100%)</b>	<b>6960</b> <b>(100%)</b>	<b>8793</b> <b>(100%)</b>



**FIGURE TYF.8.1** Number of full-time permanent faculty in mathematics programs at two-year colleges by gender in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)



**FIGURE TYF.8.2** Percentage of full-time permanent faculty in mathematics programs at two-year colleges by gender in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

**TABLE TYF.9** Percentage of full-time permanent faculty and part-time faculty in mathematics programs at public two-year colleges by gender, in fall 2005. Also masters degrees in mathematics and statistics granted in the U.S. to citizens and resident aliens, by gender, in 2003-04. Part-time faculty paid by a third party are not included.

	Percentage of		
	Full-time permanent faculty	Part-time faculty	Masters degrees in mathematics & statistics granted in the U.S. in 2003-04 to citizens and resident aliens <sup>1</sup>
Men	50	53	56%
Women	50	47	44%
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>
<b>Number</b>	<b>8793</b>	<b>18227</b>	<b>2475</b>

<sup>1</sup> Table 265, Digest of Education Statistics, 2005, National Center for Education Statistics IPEDS Annual Completion Survey. (These figures include resident aliens but do not include a total of 1716 nonresident aliens who received masters degrees.)

### Ethnicity among permanent full-time and part-time faculty

Demographic data about ethnic minority faculty among permanent full-time mathematics faculty members at two-year colleges are given in Tables TYF.10, TYF.11, TYF.12, and TYF.13. The minority groups referenced in the survey are listed in TYF.11. Tables TYF.10 and TYF.11 provide an historical perspective, while Tables TYF.12 and TYF.13 present more detailed information on the ethnic profile of the permanent full-time mathematics faculty in fall 2005, including information about both age and gender.

From 1995 to 2000, the overall number of permanent full-time mathematics faculty in two-year colleges decreased by about 8%. Although the total number of ethnic minority faculty also declined, the percentage of ethnic minorities among the permanent full-time mathematics faculty remained at about 13%. Similarly, the dramatic increase in the overall size of the permanent full-time mathematics faculty from 2000 to 2005 was matched by a proportional growth in the size of the ethnic minority faculty. In fall 2005, ethnic minority faculty constituted 14% of the permanent full-time faculty. This percentage was still two points below the ethnic minority faculty proportion in 1990.

The relative sizes of most ethnic groups within the permanent full-time faculty changed little between 2000 and 2005, but the percentage of Black (non-Hispanic) faculty (constant at 5%) was surpassed by

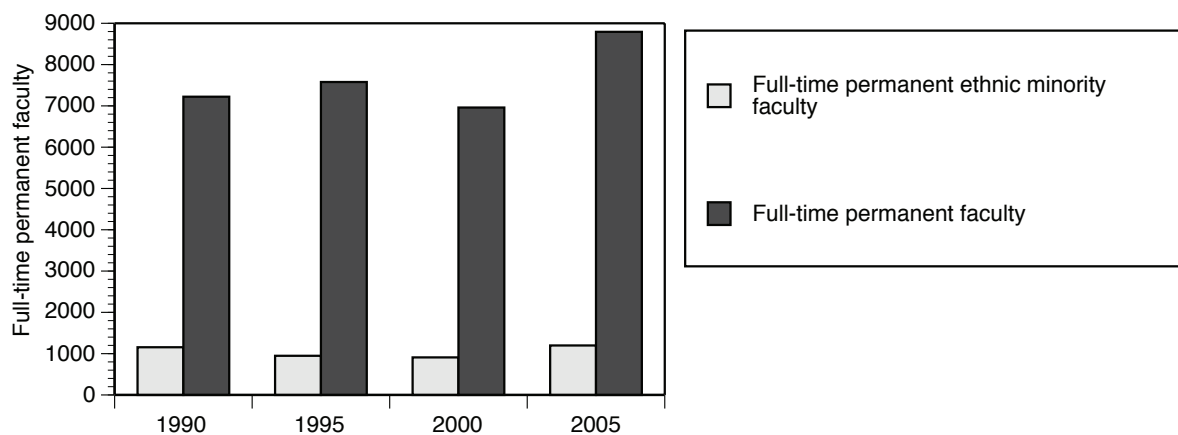
the percentage of Asian/Pacific Islanders (6%, up two points), who were the largest ethnic minority group in fall 2005.

Table TYF.12 gives the percentage of women within ethnic groups of the permanent full-time faculty. CBMS2000 had reported a significant drop in the percentage of female Black (non-Hispanic) permanent full-time faculty, from 42% in fall 1995 to 28% in fall 2000. That figure was back up to 47% in fall 2005. The percentage of Asian/Pacific Islander faculty who are women rose 16 points to 52%, the highest percentage of women in any of the ethnic groups, slightly larger proportionally than women within White (non-Hispanic) faculty. Native Americans (American Indians/Eskimo/Aleut) had the largest loss in percentage share of faculty and of women among ethnic faculty, dropping to less than 0.5% in both categories. Finally, a word of caution is in order. Compared to CBMS1995, both CBMS2005 and CBMS2000 reported large increases in the percentages of women whose ethnicity was unknown.

Between 1995 and 2000, the percentage of ethnic minority permanent full-time mathematics faculty under the age of 40 did not change, remaining at 20%. However, Table TYF.13 shows that in fall 2005 this number rose to 23%, noticeably higher than the percentage of ethnic faculty (14%) among all permanent full-time faculty members. Data on ethnicity of newly-hired faculty in fall 2005 are given in Table TYF.20.

**TABLE TYF.10** Percentage and number of ethnic minority full-time permanent faculty in mathematics programs at two-year colleges, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

	1990	1995	2000	2005
Percentage of ethnic minorities among full-time permanent faculty	16	13	13	14
Number of full-time permanent ethnic minority faculty	1155	948	909	1198
Number of full-time permanent faculty	7222	7578	6960	8793



**FIGURE TYF.10.1** Number of ethnic minority full-time permanent faculty and number of all full-time permanent faculty in mathematics programs at two-year colleges in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

**TABLE TYF.11** Percentage of full-time permanent faculty in mathematics programs at two-year colleges by ethnicity, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

Ethnic Group	Percentage of full-time permanent faculty			
	1990	1995	2000	2005
American Indian/Eskimo/Aleut	1	0	1	0
Asian/Pacific Islander	4	4	4	6
Black (non-Hispanic)	4	5	5	5
Mexican American/Puerto Rican/ other Hispanic	7	3	3	3
White (non-Hispanic)	84	87	85	84
Status unknown	na	1	2	2
<b>Number of full-time permanent faculty</b>	<b>100%</b> <b>7222</b>	<b>100%</b> <b>7578</b>	<b>100%</b> <b>6960</b>	<b>100%</b> <b>8793</b>

Note: 0 means less than half of 1%.

**TABLE TYF.12** Number and percentage of full-time permanent faculty in mathematics programs at public two-year colleges by ethnic group and percentage of women within each ethnic group, in fall 2005.

<b>Ethnic group</b>	Number of full-time permanent faculty	Percentage of ethnic group in full-time permanent faculty	Percentage of women in ethnic group
American Indian/Eskimo/Aleut	27	0	0
Asian/Pacific Islander	538	6	52
Black (non-Hispanic)	413	5	47
Mexican American/Puerto Rican/ other Hispanic	280	3	43
White (non-Hispanic)	7353	84	51
Status not known	182	2	34
<b>Total</b>	<b>8793</b>	<b>100%</b>	<b>50%</b>

Note: 0 means less than one-half of one percent.

**TABLE TYF.13** Percentage of full-time permanent faculty and of full-time permanent faculty under age 40 in mathematics programs at public two-year colleges by ethnic group, in fall 2005. Also U.S. masters degrees in mathematics and statistics granted in the U.S. to citizens and resident aliens by ethnic group in 2003–2004.

<b>Ethnic Group</b>	Percentage among all full-time permanent faculty	Percentage among full-time permanent faculty under age 40	Masters degrees in mathematics and statistics granted in the U.S. in 2003–04 to citizens and resident aliens <sup>1</sup>
Ethnic minorities	14	23	22
White (non-Hispanic)	84	76	78
Unknown	2	1	0
<b>Total Number</b>	<b>100%</b> <b>8793</b>	<b>100%</b> <b>2209</b>	<b>100%</b> <b>2475</b>

<sup>1</sup> Table 265, Digest of Education Statistics, 2005, National Center for Education Statistics IPEDS Annual Completion Survey. (These figures include resident aliens but do not include a total of 1716 nonresident aliens who received masters degrees.)



In fall 2005, about 16% of part-time faculty members were ethnic minorities, which was up three percentage points from 2000. The comparable figure in 1995 was 13%, the same as in 2000. Among the permanent full-time faculty, Asian/Pacific Islanders and Blacks (non-Hispanic) were the two largest groups.

**TABLE TYF.14** Percentage of ethnic minority part-time faculty in mathematics programs at public two-year colleges, in fall 2005.

Percentage of ethnic minorities among part-time faculty	16
Number of part-time faculty	18227

**TABLE TYF.15** Number and percentage of part-time faculty in mathematics programs at public two-year colleges by ethnic group and percentage of women within ethnic groups, in fall 2005.

<b>Ethnic group</b>	<b>Number of part-time faculty</b>	<b>Percentage of ethnic group among all part-time faculty</b>	<b>Percentage of women within ethnic group</b>
American Indian/Eskimo/Aleut	106	1	18
Asian/Pacific Islander	1045	6	46
Black (non-Hispanic)	1181	6	47
Mexican American/Puerto Rican/ other Hispanic	521	3	45
White (non-Hispanic)	14833	81	48
Status not known	541	3	45
<b>Total</b>	<b>18227</b>	<b>100%</b>	<b>47%</b>

#### **Age distribution of permanent full-time faculty**

In fall 1990, CBMS reported that the average age of the permanent full-time mathematics faculty at two-year colleges was 45.4 years. In five-year steps, corresponding to CBMS reports in 1995 and 2000, this average age rose successively to 47.2 and 47.6 years. In fall 2005 the average faculty age was 47.8, again slightly up. (See Table S.18 in Chapter 1.) During this fifteen-year period (1990 to 2005), the two-year college mathematics faculty, as a cohort, has been getting older, but the rate of this aging has slowed from the rate for 1990 to 1995. For comparison, Chapter 4 gives age and other demographic data about mathematics faculty in four-year institutions.

The percentage of permanent full-time faculty under age 40 slid gradually from 47% in 1975 to 21% in 1995. It rose to almost 26% in 2000 and in 2005 maintained its level at just over 25%. Among ethnic minority faculty, 23% were under age 40 in fall 2005, as reported in Table TYF.13. At the other end of the age range, the percentage of permanent full-time faculty over age 54 had grown from 12% in 1975 to 18% in 1995, reached 27% in 2000, and was at 29% in fall 2005.

While the size of the permanent full-time faculty grew about 26% from 2000 to 2005, this growth was by no means equally distributed among the age categories. As would be expected, there was a 64% growth

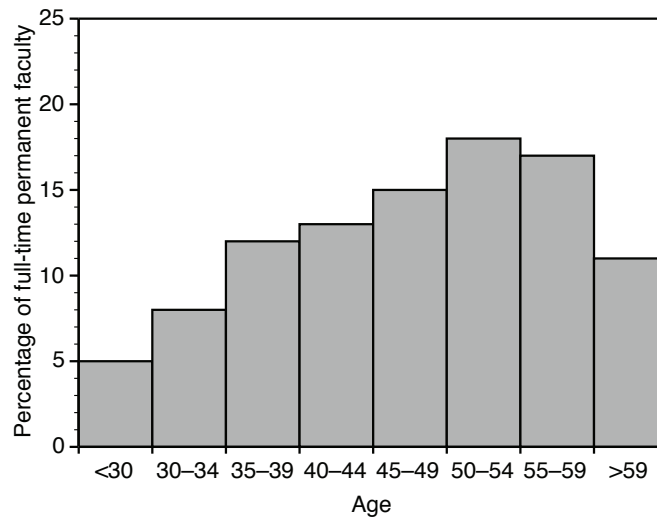
in faculty under 30, double the 32% growth in the faculty age 55 and over.

Women were a majority in the 45–54 age group, just as they were in 2000. They made up only 43% of

the over-54 age group. Otherwise, in terms of age, as reported in TYF.17, their distribution in the faculty matched that of men.

**TABLE TYF.16** Percentage and number of full-time permanent faculty in mathematics programs at two-year colleges by age, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

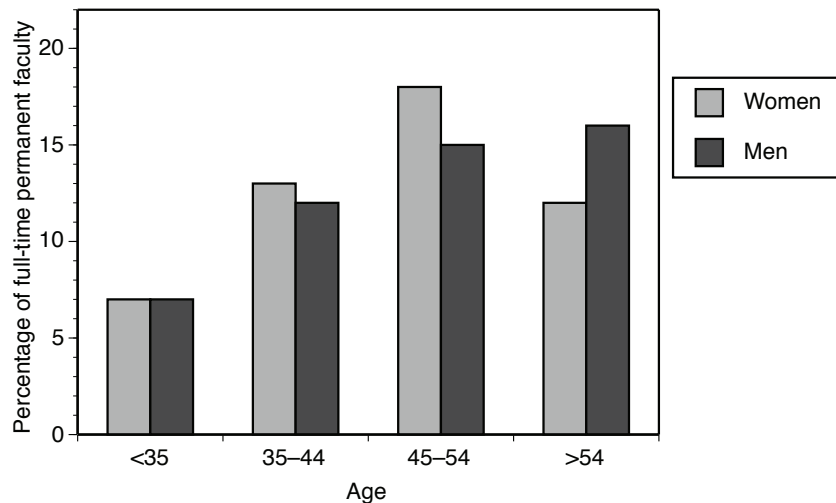
Age	Percentage of full-time permanent faculty				Number of full-time permanent faculty			
	1990	1995	2000	2005	1990	1995	2000	2005
<30	5	5	4	5	361	358	290	478
30–34	8	8	9	8	578	580	615	716
35–39	10	8	13	12	722	633	890	1037
40–44	21	14	11	13	1517	1044	763	1163
45–49	22	22	15	15	1589	1672	1075	1298
50–54	21	26	20	18	1517	1933	1418	1574
55–59	8	13	16	17	578	966	1146	1528
>59	5	5	11	11	360	391	763	999
<b>Total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>7222</b>	<b>7577</b>	<b>6960</b>	<b>8793</b>



**FIGURE TYF.16.1** Percentage distribution of full-time permanent faculty in mathematics programs at public two-year colleges by age in fall 2005.

**TABLE TYF.17** Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by age and by gender and percentage of women by age, in fall 2005.

Age	Percentage of full-time permanent faculty		Percentage of women in age group
	Women	Men	
<35	7	7	49
35–44	13	12	50
45–54	18	15	55
>54	12	16	43
<b>Total</b>	<b>50%</b>	<b>50%</b>	

**FIGURE TYF.17.1** Percentage of full-time permanent faculty in mathematics programs at public two-year colleges by gender and age in fall 2005.

### Demographics of Permanent Full-time Faculty Newly Hired by Mathematics Programs for Fall 2005

#### Number and source of new permanent full-time faculty

Two-year college mathematics programs hired about 600 new permanent full-time faculty members for fall 2005. This was about the same size as the new faculty cohort in fall 2000 and was a second strong increase (as recorded by CBMS surveys) over the 305 new hires reported for fall 1995. In fact, the dramatic total increase in faculty size (by 1,833 permanent full-time positions) as well as the on-going replacement of exiting faculty suggest permanent faculty positions in the range of 500 persons per year were being filled throughout the period 2000 to 2005.

For fall 2005, hiring patterns moved back toward those of 1995. In 1995, 30% of new faculty members

were hired directly out of graduate school, about the same percentage as in 1990. In 2000, this fell to 8%. In 2005, graduate school as a faculty source rose to 23%. Similarly, the percentage of new hires previously teaching at a four-year institution dropped eight percentage points to 10% in 2000. In 2005, this percentage was back up to 18%. Hiring from among part-time faculty at the same institution almost doubled, to 34%, in 2000. It remained high at 29% in 2005 but had moved back toward the 19% level of 1995.

In 2000, the percentage of secondary school teachers among newly-hired faculty rose from 4% to 22%, an anomaly in the long-term pattern that was more characteristic of the earliest years of two-year college hiring. This percentage for new hires fell back to 13% in 2005. In 1979, about 60% of all two-year college mathematics faculty had come from secondary schools [MALL].

**TABLE TYF.18** Percentage of newly appointed full-time permanent faculty in mathematics programs at two-year colleges coming from various sources, in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

Source	Percentage of new faculty from	
	2000	2005
Graduate school	8	23
Teaching in a four-year college or university	10	18
Teaching in another two-year college	19	11
Teaching in a secondary school	22	13
Part-time or full-time temporary employment at the same college	34	29
Nonacademic employment	6	5
Unemployed	0	0
Unknown	1	1
<b>Total number hired</b>	<b>100%</b> <b>572</b>	<b>100%</b> <b>605</b>

#### **Educational credentials of newly-hired permanent full-time faculty**

The masters degree was held by 84% of newly-hired permanent full-time faculty in fall 2005. This percentage was 18 points higher than in 2000. Combined with a 14-point drop from 2000 (to 5% in 2005) in the number of newly-hired permanent full-time faculty whose highest degree was a bachelors degree, this 84% suggests a strong return to the masters degree as the standard entry-level credential for two-year college permanent full-time mathematics faculty.

In 2000, the CBMS report voiced concern at the high level of permanent full-time faculty being hired with no degree beyond the bachelors, a change from historical practice being implemented at a time when large numbers of retiring faculty were being replaced with new hires. If continued over time, the 2000 report expressed concern that there could be a rapid drop in the percentage of masters degrees among permanent full-time mathematics faculty within two-year college mathematics programs. This could lead to a two-tiered faculty structure within the programs, to an overall change in program philosophy and cohesiveness, and to conflicts with four-year colleges and universities on course comparability and transferability. Fortunately, the 2005 data indicate a return to traditional practice. For example, 80% of new hires in fall 1995 held a masters degree, compared to 84% in 2005.

It is important to note again the likely influence of accrediting agencies in the return to “masters-degree-minimum” hiring. Anecdotal evidence indicates that these agencies were very active during the period 2000 to 2005 regarding verification of faculty credentials. Most accrediting agencies require that two-year college faculty who teach courses that transfer for baccalaureate degree credit hold a masters degree with an 18 semester-hour graduate credit concentration in the academic field in which they are teaching. Accrediting agencies usually allow faculty who teach precollege (remedial) or developmental courses to hold only a bachelors degree, provided the major is in the subject that they are teaching.

In fall 2005, about 12% of the newly-hired permanent full-time mathematics faculty held a doctorate, a one-point drop from fall 2000 but seven percentage points below 1995. The 13% doctorate level for new hires in 2000 had reversed the trend reported in the 1995 CBMS survey of two-year colleges hiring more new permanent full-time faculty members with doctorates than they had previously. Prior to 1995, CBMS surveys found that two-year colleges hired very few permanent full-time faculty members with doctorates and that faculty earned their doctorates while on the job. The 1990 survey found, for example, that 2% of new hires had doctorates, rising to 19% in 1995. During the decade from 1995 to 2005, this number seemed to stabilize in the neighborhood of 12%.

**TABLE TYF.19** Percentage of full-time permanent faculty newly hired for mathematics programs at two-year colleges by highest degree, in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

Highest degree	Percentage of new hires	
	2000–2001	2005–2006
Doctorate	13	12
Masters	66	84
Bachelors	19	5
Unknown	2	0
<b>Total</b>	<b>100%</b>	<b>100%</b>

Note: 0 means less than one-half of one percent and round-off may make column totals seem inaccurate.

#### Gender, ethnicity, and age of newly-hired permanent full-time faculty

For 2005, about 53% of new mathematics faculty hires were women, up 11 percentage points from 2000. As noted earlier in this chapter, this bodes well for maintaining a 50-50 split between women and men in the permanent full-time faculty. Table TYF.20 shows White (non-Hispanic) faculty comprised 80% of new hires for 2005, down 6 points from 2000. Overall, 19% of new hires in 2005 were ethnic minorities, up six points from 2000 but a four-percentage-point drop from 1995.

Table TYF.21 gives the percentage of new hires whose ages fall in five-year intervals beginning at age 30. As would be expected, almost 60% of new hires were under age 40, but this was ten percentage points

lower than in 2000, when 70% of new hires were under age 40. In 2005, 30% of new hires were between age 40 and 50, a sharp rise from the 11% in 2000. This may reflect the already noted 18% of new hires who came to two-year colleges from four-year institutions, up eight points from 2000. The reduced percentage of new hires between 30 and 39 years old is interesting. This number dropped to 32% from 58% in 2000, but the percentage of new hires under age 35, rising from 31% in 2000 to 42% in 2005, is consistent with other CBMS2005 data (Table TYF.18) showing that graduate school is the largest source of new hires other than a college's own current part-time faculty.

Information about gender, ethnicity, and age of new hires was not collected in CBMS surveys prior to 1995.

**TABLE TYF.20** Percentage of full-time permanent faculty newly hired for mathematics programs at two-year colleges by ethnic group, in fall 2000 and 2005. Also percentage of women within each ethnic group in fall 2005. (Data for 2005 include only public two-year colleges.)

Ethnic group	Percentage of new hires		Percentage of women in ethnic group for 2005–2006 new hires
	2000–2001	2005–2006	
Asian/Pacific Islander	7	7	49
Black (non-Hispanic)	1	1	100
Mexican American/Puerto Rican/other Hispanic	5	11	62
White (non-Hispanic)	86	80	52
Unknown	1	1	31
<b>Percentage of women among all new hires</b>	<b>42%</b>	<b>53%</b>	<b>--</b>

**TABLE TYF.21** Percentage of full-time permanent faculty newly hired for mathematics programs at two-year colleges by age, in fall 2000 and 2005. (Data for 2005 includes only public two-year colleges.)

Age	Percentage of new hires	
	2000	2005
<30	11	22
30–34	21	20
35–39	37	17
40–44	5	15
45–49	6	15
50–54	12	5
55–59	6	0
>59	3	6
<b>Total</b>	<b>100%</b>	<b>100%</b>

### Outflow of Permanent Full-time Mathematics Faculty

During academic year 2004–2005, 439 people left their permanent full-time mathematics faculty positions at two-year colleges. This was 9% more than the 401 who left during 1999–2000. Using 8,793 as the estimate of permanent full-time faculty in fall 2005, 439 was almost 5% of the faculty, down from about 5.7% in 1999–2000. However, one should note that the percentage for 2004–2005 is strongly affected by an increased denominator in the percentage calculation, from 6,960 in 2000 to 8,793 in 2005. For the

long-term historical pattern, the outflow in academic year 1994–1995 was 402 people or about 5.3% of the fall 1995 permanent full-time faculty. In 1989–1990, the outflow was 317 (4.4%), and in 1984–1985 it was 449 (7.1%).

In 2004–2005, about 67% of those who left a permanent faculty position were accounted for by death or retirement. This was a sharp rise from 1999–2000 when about 41% of the outflow left for these reasons but comparable to the 68% in 1994–1995. No information was available for about 24% of the departures.

**TABLE TYF.22** Outflow of full-time permanent faculty from mathematics programs at public two-year colleges, in 2004–2005.

Status	Number
Died or retired	292
Teaching in a four-year college or university	9
Teaching in another two-year college	14
Teaching in a secondary school	2
Left for a nonacademic position	5
Returned to graduate school	3
Other	107
Unknown	7
<b>Total</b>	<b>439</b>

## Resources Available to Mathematics Program Faculty

### Computer and office facilities for part-time faculty

To gauge the extent to which two-year colleges were making computer technology available to faculty members, in 1995 the CBMS survey first collected information on the availability of office computers and other computer facilities to full-time faculty members. By 2000, office computers for permanent full-time faculty were nearly universal. So, in 2005, the CBMS survey asked about office computers only for part-

time faculty. About two-thirds of colleges reported computers available in part-time offices with the remaining one-third reporting shared computer access near the office. Only 2% reported no convenient access to computers or terminals for part-time faculty.

Between 1995 and 2000, there was an eight-percentage-point jump in the number of part-time faculty who shared a desk with two or more people. In 2005, this figure jumped another 14 points to 65% with a seven-point drop to 5% of part-time faculty who had their own desk. In 1995, 18% of part-time faculty had their own desk.

**TABLE TYF.23** Percentage of part-time faculty in mathematics programs at two-year colleges by desk availability, in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

Desk availability	Percentage of part-time faculty	
	2000	2005
Have their own desk	12	5
Share a desk with one other person	5	7
Share a desk with two or more other people	51	65
Have no desk, or unknown	31	23

**TABLE TYF.24** Percentage of part-time faculty in mathematics programs at public two-year colleges by access to computer facilities in fall 2005.

Computer facilities for part-time faculty	Percentage of part-time faculty
Computer or terminal in office	63
No computer or terminal in office, but shared computers or terminals nearby	35
No convenient access or no access at all to computers or terminals	2

### Teaching evaluation

In fall 2005 there was an unexpected nine-percentage-point drop, to 89%, in the percentage of two-year colleges that periodically evaluated the teaching of permanent full-time mathematics faculty members. In fall 2000, this figure was 98%, and in fall 1995, it was 100%. In 2005, periodic teaching evaluation was required for part-time faculty at 89% of colleges, a proportion almost identical to the 88% reported in 2000. Data on evaluation of part-time faculty were not collected in the 1995 survey.

In 2005, there was a strong jump in the percentage of colleges that used classroom visitation by a division or department chair or other administrator as a component of full-time faculty evaluation. In 2005, the percentage rose to 61% from 52% in 2000. Simultaneously, the percentage of colleges using classroom observation by other faculty (not administrators) dropped 12 points to 52%. Together, these facts suggest a move in fall 2005 towards a somewhat less collegial evaluation system for full-time faculty.

The most common method of evaluating teaching remained the use of evaluation instruments completed by students. For full-time faculty, this was up to 96%, from 90% in 2000. It had been 97% in 1995. To evaluate part-time faculty, a student questionnaire was used by 94% of colleges (up from 87% in 2000). Self-evaluation portfolios were used as a component of the evaluation of full-time faculty by 46% of colleges, both in 2005 and in 2000. For full-time faculty, evaluation of written materials—such as syllabi or course examinations—rose from 48% to 55%. The use of such written materials for part-time faculty evaluation rose nine points from 2000 to 49% in 2005. For part-time faculty, observation of classes by an administrator remained very low, 33% in 2005 (up from 28% in 2000). However, observation of classes taught by part-time faculty by non-administrative faculty rose from 60% of colleges in 2000 to 64% in 2005. It is common for full-time faculty at two-year colleges to have a major involvement in orienting, assisting, supervising, and evaluating part-time faculty.

**TABLE TYF.25** Percentage of two-year colleges that require periodic teaching evaluations for all full-time or part-time faculty, in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

<b>Teaching evaluation</b>	Percentage of two-year colleges in fall 2000	Percentage of two-year colleges in fall 2005
that require teaching evaluations for all full-time faculty	98	89
that require teaching evaluations for all part-time faculty	88	89



**TABLE TYF.26** Percentage of mathematics programs at public two-year colleges using various methods of evaluating teaching of part-time and full-time faculty, in fall 2005.

Method of evaluating teaching	Percentage of programs using evaluation method for	
	Part-time faculty	Full-time faculty
Observation of classes by other faculty	64	52
Observation of classes by division head (if different from chair) or other administrator	33	61
Evaluation forms completed by students	94	96
Evaluation of written course material such as lesson plans, syllabus, or exams	49	55
Self-evaluation such as teaching portfolios	19	46
Other methods	0	5

Note: 0 means less than one-half of one percent.

### Professional development obligations and activities of permanent full-time faculty

In fall 2005, as reported in Table TYF.27, some form of continuing education or professional development was required of permanent full-time faculty members at 55% of two-year colleges. This percentage had been 38% in 2000. The fall 2005 percentage was almost triple the 1995 percentage of 20%. This decade-long increase in required professional development for permanent full-time faculty parallels the increased faculty use of various professional development opportunities, also reported in Table TYF.27. Slightly more than half of the permanent full-time faculty met part of their professional development obligation through activities provided by their own colleges. This figure was 36% in 2000. About 38% (perhaps overlapping with the previous category) participated in activities provided by professional societies, up from 31% in 2000.

Direct comparison of CBMS2005 and CBMS2000 data to the professional development data from CBMS1995 is not possible due to changes in the

format of the two-year college questionnaire for 2005 and 2000. The 1995 survey asked about participation in a wide variety of specific professional development activities, while the CBMS2005 and CBMS2000 questionnaires asked about broad categories of activities. Even so, one important observation is possible concerning involvement in professional societies by full-time mathematics faculty at two-year colleges. The 1995 CBMS survey found that over 70% of permanent full-time mathematics faculty participated in professional meetings, while CBMS2005 reported only 38% (31% in 2000) used this resource to fulfill professional development responsibilities. This likely reflects a concern expressed by 44% of program heads (TYF.29) about the level of travel funding for faculty. Nonetheless, attendance at the annual conference sponsored by the American Mathematical Association of Two-Year Colleges (AMATYC) has remained strong throughout the period 2000 to 2005, numbering about 1,200 each year, though generally not increasing to the same extent that full-time faculty size increased.

**TABLE TYF.27** Percentage of two-year colleges that require some form of continuing education or professional development for full-time permanent faculty, and percentage of faculty using various methods to fulfill those requirements, in mathematics programs at two-year colleges in fall 2000 and 2005. (Data for 2005 include only public two-year colleges.)

<b>Faculty Development</b>	Fall 2000	Fall 2005
Percentage of institutions requiring continuing education or professional development for full-time permanent faculty	38%	55%
<b>How Faculty Meet Professional Development Requirements</b>	<b>Percentage of permanent faculty in fall 2000</b>	<b>Percentage of permanent faculty in fall 2005</b>
Activities provided by employer	36	53
Activities provided by professional associations	31	38
Publishing books or research or expository papers	3	6
Continuing graduate education	8	7

### Problems in Mathematics Programs

In every CBMS survey since 1985, 60% or more of mathematics program heads classified the need for too much student remediation as a major problem for their programs. In fall 2005, this figure was 63%. The fall 2000 figure was 62%. A new category was introduced in 2005, namely, students' lack of understanding of the demands of college work. This showed up as second in the ranking of major problems, reported by 55% of mathematics program heads. Low student motivation ranked third, as reported by 50% of mathematics program heads. This had been the second category in both 2000 (47%) and 1995

(51%). Rounding out the top five in 2005 were lack of student progress from developmental to advanced courses (34%), need to use too many part-time faculty (30%), and a fifth-place tie between low faculty salaries and inadequate travel funds (22% each). These were the same topics that ranked in the top five in 2000. All other major problems listed showed a much lower percentage of mathematics programs than these five. See Tables TYF.28 and TYF.29 both for the historical perspective on these issues and the fall 2005 ratings. These tables also include data on the extent to which program heads thought these matters were somewhat of a problem, though not a major one.

### Administration of Mathematics Programs

Between 1995 and 2000, two-year colleges (like four-year institutions) made a major shift to the semester system. In fall 2000, 93% of two-year colleges operated under the semester structure, up from 73% in 1995. The use of the semester system had become so widespread after 2000 that CBMS2005 elected to omit this question from the survey in 2005.

In fall 2000, as in 1995, about 43% of two-year college mathematics programs were administered as departments, with 10% of these being multi-campus departmental systems. In 2005, 41% reported a departmental structure, with only 2% of these being part of

a multi-campus organization. A division structure, where mathematics is combined with science or other disciplines, was found in 53% of two-year colleges, down slightly from the 55% reported in 2000.

Historically, mathematics courses at two-year colleges have been taught in many different administrative units other than in mathematics programs. This practice continued in fall 2005, as shown in Table TYE.17 at the end of Chapter 6. The location of precollege (remedial) mathematics courses within a college's academic structure always has been of special interest. In fall 2005, about 31% of colleges reported that some precollege mathematics courses were taught outside of the mathematics program,

**TABLE TYF.28** Percentage of program heads classifying various problems as "major" in mathematics programs at two-year colleges, in fall 1990, 1995, 2000, and 2005. (Data for 2005 include only public two-year colleges.)

Problem	Percentage of program heads classifying problem as major			
	1990	1995	2000	2005
Maintaining vitality of faculty	22	11	9	2
Dual-enrollment courses	na	na	8	5
Staffing statistics courses	na	4	2	3
Students don't understand demands of college work	na	na	na	55
Need to use part-time faculty for too many courses	na	30	39	30
Faculty salaries too low	na	31	36	22
Class sizes too large	10	11	10	5
Low student motivation	38	51	47	50
Too many students needing remediation	65	63	62	63
Lack of student progress from developmental to advanced courses	na	na	na	34
Low success rate in transfer-level courses	na	15	8	7
Too few students who intend to transfer actually do	na	7	2	4
Inadequate travel funds for faculty	26	21	15	22
Inadequate classroom facilities for use of technology	na	na	na	12
Inadequate computer facilities for part-time faculty use	na	na	na	9
Inadequate computer facilities for student services	na	23	3	1
Commercial outsourcing of instruction	na	na	1	0
Heavy classroom duties prevent personal & teaching enrichment by faculty	na	na	na	14
Coordinating mathematics courses with high schools	9	8	6	7
Lack of curricular flexibility because of transfer rules	10	6	1	7
Use of distance education	na	na	10	6

Note: 0 means less than one-half of one percent.

**TABLE TYF.29** Percentage of program heads of mathematics programs at public two-year colleges classifying various problems by severity in fall 2005.

Problem	Percentage of program heads classifying problems as		
	minor or no problem	somewhat of a problem	major problem
Maintaining vitality of faculty	77	21	2
Dual-enrollment courses	74	21	5
Staffing statistics courses	88	9	3
Students don't understand demands of college work	10	35	55
Need to use part-time faculty for too many courses	38	32	30
Faculty salaries too low	32	46	22
Class sizes too large	72	23	5
Low student motivation	20	31	50
Too many students needing remediation	8	28	63
Lack of student progress from developmental to advanced	29	37	34
Low success rate in transfer-level courses	58	35	7
Too few students who intend to transfer actually do	73	23	4
Inadequate travel funds for faculty	56	22	22
Inadequate classroom facilities for use of technology	74	14	12
Inadequate computer facilities for part-time faculty use	72	18	9
Inadequate computer facilities for student services	89	10	1
Commercial outsourcing of instruction	98	2	0
Heavy classroom duties prevent personal & teaching enrichment by faculty	47	39	14
Coordinating mathematics courses with high schools	77	17	7
Lack of curricular flexibility because of transfer rules	77	17	7
Use of distance education	83	11	6

Note: 0 means less than one-half of 1% and round-off may make row sums seem inaccurate.

most likely in a developmental studies unit or in a laboratory setting. This was very similar to the 29% reported in 2000 and the 30% found in 1995.

### Topics of Special Interest for Mathematics Programs

In each CBMS survey cycle, certain topics of special interest are chosen for data collection and comprehensive analysis across both two-year and four-year colleges. In fall 2005, six such topics were chosen. They are discussed in Chapter 2 of this report. Two of them, pre-service education of K-8 teachers and

faculty who teach dual-enrollment courses, are relevant to the current chapter. The special interest topic that deals with resources available to undergraduates (such as placement testing and tutoring labs) was covered in Chapter 6.

### Scope and organization of pre-service mathematics education for K-8 teachers

CBMS2005 expanded an inquiry begun in 2000 about the level of involvement of two-year college mathematics programs in the mathematical education of future mathematics teachers. These data are

**TABLE TYF.30** Percentage of mathematics programs at public two-year colleges by type of administrative structure, in fall 2005.

	Percentage of Mathematics Programs	
	On their own campus	As part of a multicampus organization
<b>Administrative structure</b>		
Mathematics department	39	2
Mathematics and science department or division	35	1
Other department or division structure	15	2
None of the above or unknown	6	

reported primarily among the special topics in Chapter 2, especially in Tables SP.2 and SP.4.

Anecdotal evidence has suggested a growing involvement in teacher education at two-year colleges as more students turned to them, especially in summer sessions, to take required mathematics courses. Regarding the Mathematics for Elementary Teachers course, fall 2005 survey data confirm this involvement, reporting 29,000 students enrolled. This number was an attention-getting 61% increase from the 18,000 reported in 2000. See Table TYE.3 in Chapter 6.

CBMS2005 determined that 66% of two-year colleges offered the course Mathematics for Elementary School Teachers either in academic year 2004–2005 or in academic year 2005–2006. CBMS2000 showed this availability percentage was 49% for the combination of years 1999–2000 and 2000–2001. See Table TYE.5 in Chapter 6. The growth in fall term offerings for this course at two-year colleges, beginning in 1990 for five-year CBMS intervals, is reported in TYE.6 as successively 32%, 43%, 49%, and 59%.

Table SP.2 reports on organized programs at two-year colleges in which students can obtain their entire mathematics course requirement for teacher licensure. These data confirm that two-year colleges are involved in teacher education primarily at the K–8 level, though it is also creditable to assert that future secondary school teachers often take their lower-division mathematics courses at two-year colleges. The single largest component, reported by 30% of two-year colleges, is the program for pre-service elementary school teachers. Pre-service middle school licensure-oriented programs were reported at 19% of colleges. The flexible nature of two-year colleges makes them an attractive venue for in-service teacher education

and for retraining by career switchers moving into teaching. Between 15% and 20% of two-year colleges reported programs at the elementary or middle school levels for these populations.

Table SP.4 reports on other involvements two-year college mathematics programs have with K–8 teacher education. Almost 40% report that a faculty member is assigned to coordinate mathematics education for future K–8 teachers. About 11% designate special sections of courses other than Mathematics for Elementary School Teachers for attendance by future teachers. Among mathematics departments, 9% offer mathematics pedagogy courses for future K–8 teachers, and 10% of colleges offer such pedagogy courses outside of the mathematics department.

The conclusion in Chapter 2 is that, given the large number of two-year colleges in the United States, even when the percentage of colleges involved in the education of future K–8 teachers is small, the cumulative impact of two-year colleges on the next generation of K–8 teachers can be significant. As a harbinger of this potential impact, in January 2007 the two principal higher education governing boards in Florida agreed the state's two-year colleges could offer certain bachelors degrees, education being one.

#### **Credentials and supervision of dual-enrollment faculty**

Dual enrollment is a credit structure that allows high school students to receive simultaneous high school and college credit for courses that were taught at a high school by a high school teacher. Data in Chapter 2 (Tables SP.16 and SP.17) show how large the dual-enrollment system had become by fall 2005 when (for example) just over 19% of all two-year college enrollments in the Precalculus course were

dually enrolled and 18% of all Calculus I students were dually enrolled.

A faculty member teaching a dual-enrollment course usually was classified as a part-time faculty member at the two-year college that awarded college credit for the course, even though the salary was paid completely by a third party, e.g., the local school district. CBMS2000, the last available survey with relevant data, reported that nine out of ten of these “third-party” faculty members met the same academic credential requirements as regular part-time faculty. Given the enhanced monitoring of academic credentials by accrediting agencies mentioned above, just after Table TYF.3, it is unlikely the degree requirements for these “third party” faculty members have fallen off since 2000.

In fall 2005, 42,000 dual-enrolled students were taught by “third party” part-time faculty. Only 12% of colleges assigned their own direct-pay full-time or part-time faculty to teach dual-credit classes on a high school campus. These direct-pay faculty members taught about 2000 additional such students. See Tables SP.16 and SP.17 in Chapter 2.

In the 2000 survey, CBMS first investigated the extent to which two-year college mathematics programs retained control of various aspects of these dual-enrollment courses. This exploration was expanded in the 2005 survey. Overall, the conclusion in Chapter 2 is that the supervisory record for dual-enrollment courses will not be entirely reassuring to those who expect colleges to control the content and depth of the courses for which they are granting credit. See Table SP.16 in Chapter 2.

As presented in SP.16, only 52% of two-year college mathematics programs reported they always had full

control over the selection of instructors for dual-enrollment courses, down almost ten points from the 2000 report (61%). In 74% of cases, the textbook used by a dual-enrollment instructor always was controlled by the college mathematics program, down five points from 2000. Only 37% of two-year college mathematics programs reported controlling the final examinations in their dual-enrollment courses, a very large decline of 20 percentage points from 2000. However, 89% of colleges reported they always had syllabus design or syllabus approval for dual-enrollment courses, up from 82% in 2000. In only 64% of cases was the college’s usual teaching evaluation for part-time faculty required in dual-enrollment courses. This was down from 67% in 2000.

In spite of some of the issues raised in the preceding paragraph, as reported in Tables TYF.28 and TYF.29, among all survey respondents (who, it should be noted, include respondents from colleges that do not have dual-enrollment arrangements), only 5% of mathematics program heads in two-year colleges saw dual-enrollment courses as a major problem, down three points from 2000. Another 8% found dual-enrollment arrangements somewhat of a problem, down 13 points from 2000. In CBMS2000, the latest available satisfaction data from the subset of colleges that reported they actually had functioning dual-enrollment programs, only about 13% said dual enrollment was a major problem, and only an additional 14% said it was a moderate problem. In this group of actual users of dual enrollment in fall 2000, about 72% said dual enrollment was only a minor problem or no problem.