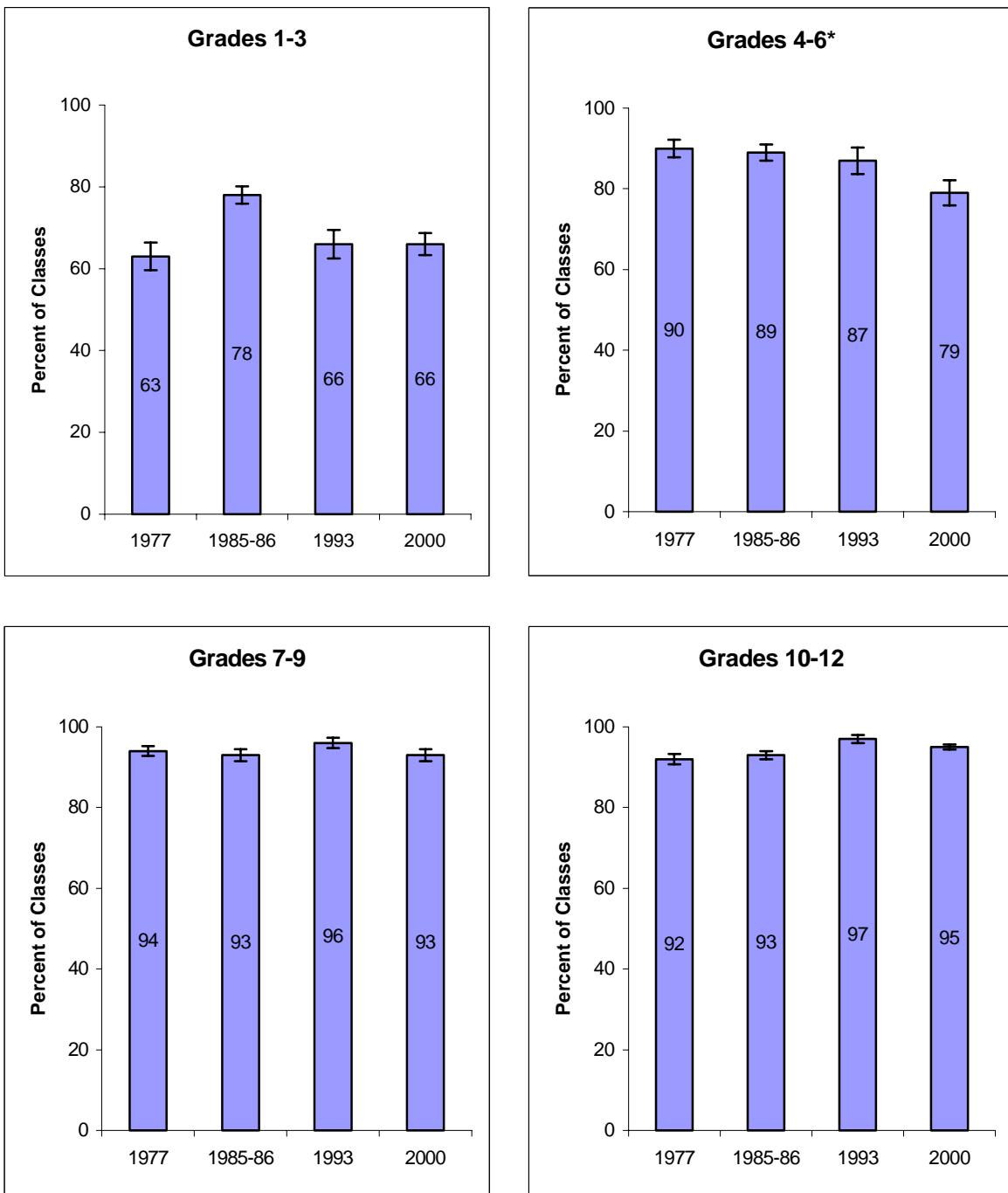


Section Five

Instructional Resources

Figures 5.1 and 5.2 show the trend in textbook use from 1977 to 2000. These data indicate that textbook use in both science and mathematics classes has remained fairly stable since 1993. The only exceptions were decreases in textbook usage since 1993 in grade 1–3 and grade 4–6 mathematics. In all years, grade 1–3 science classes were least likely to report use of published textbooks.

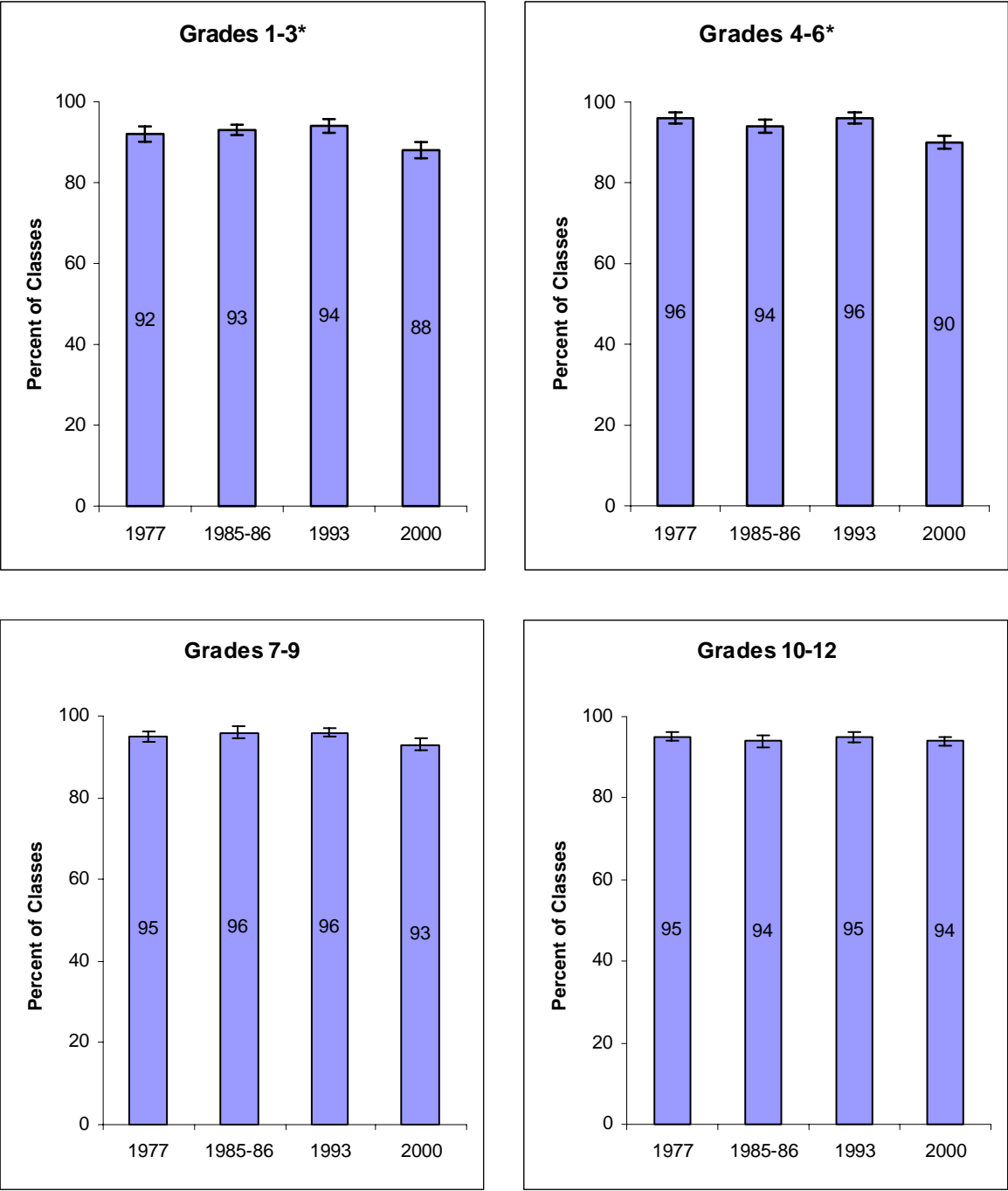
Science Classes Using Commercially Published Textbooks/Programs



* Grades 4-6: 2000 ≠ 1977, $p < 0.05$

Figure 5.1

Mathematics Classes Using Commercially Published Textbooks/Programs



* Grades 1-3: 2000 ≠ 1993; Grades 4-6: 2000 ≠ 1993, 2000 ≠ 1977, $p < 0.05$

Figure 5.2

As in 1993, two-thirds or more of the mathematics classes in 2000 reported covering a substantial portion (75 percent or more) of their textbook, compared to one-half or fewer of science classes. (See Tables 5.1 and 5.2.) A notable change since 1993 occurred in grade 1–4 mathematics, with 42 percent of the classrooms completing more than 90 percent of their text, a significant increase over the 30 percent of the classrooms doing so in 1993.

Table 5.1
Percentage of Science Textbooks/Programs
Covered During the Course,[§] by Grade Range: 1993 and 2000

	Percent of Classes			
	1993		2000	
Grades 1–4				
Less than 25 percent	10	(2.6)	4*	(1.2)
25–49 percent	17	(3.7)	17	(2.4)
50–74 percent	20	(2.8)	30*	(3.3)
75–90 percent	30	(2.4)	23*	(2.4)
More than 90 percent	22	(3.3)	26	(2.9)
Grades 5–8				
Less than 25 percent	9	(1.7)	8	(1.5)
25–49 percent	19	(2.0)	19	(2.2)
50–74 percent	30	(3.3)	33	(2.7)
75–90 percent	33	(3.7)	28	(2.5)
More than 90 percent	10	(1.5)	11	(1.7)
Grades 9–12				
Less than 25 percent	3	(0.8)	3	(0.6)
25–49 percent	16	(2.3)	13	(1.4)
50–74 percent	36	(1.8)	38	(2.3)
75–90 percent	37	(2.7)	37	(2.2)
More than 90 percent	8	(1.1)	9	(1.1)

* p < 0.05

§ Only classes using published textbooks/programs were included in these analyses.

Table 5.2
Percentage of Mathematics Textbooks/Programs
Covered During the Course,[§] by Grade Range: 1993 and 2000

	Percent of Classes			
	1993		2000	
Grades 1–4				
Less than 25 percent	1	(0.5)	1	(0.4)
25–49 percent	4	(0.8)	3	(0.9)
50–74 percent	21	(1.9)	17	(2.3)
75–90 percent	44	(2.2)	38	(2.7)
More than 90 percent	30	(2.1)	42*	(3.3)
Grades 5–8				
Less than 25 percent	1	(0.2)	1	(0.5)
25–49 percent	4	(0.9)	5	(1.1)
50–74 percent	23	(2.6)	27	(2.5)
75–90 percent	50	(2.7)	46	(3.3)
More than 90 percent	22	(2.1)	21	(2.2)
Grades 9–12				
Less than 25 percent	0	(0.2)	1*	(0.2)
25–49 percent	7	(0.7)	6	(0.8)
50–74 percent	23	(2.1)	28	(2.0)
75–90 percent	48	(2.3)	47	(2.4)
More than 90 percent	21	(1.3)	19	(1.5)

* $p < 0.05$

§ Only classes using published textbooks/programs were included in these analyses.

Teacher ratings of the quality of their textbooks/programs in 2000 were quite similar to those in 1993, with most teachers rating their textbooks good or very good. (See Tables 5.3 and 5.4.)

Table 5.3
Teachers' Perceptions of Quality of Textbooks/Programs
Used in Science Classes,[§] by Grade Range: 1993 and 2000

	Percent of Classes			
	1993		2000	
Grades 1-4				
Very poor	3	(0.8)	4	(1.3)
Poor	8	(1.4)	8	(1.7)
Fair	27	(2.5)	34	(3.2)
Good	38	(3.4)	32	(3.2)
Very good	18	(1.8)	19	(2.7)
Excellent	7	(1.4)	3*	(1.1)
Grades 5-8				
Very poor	3	(0.5)	3	(0.9)
Poor	5	(1.1)	8	(2.6)
Fair	23	(2.3)	28	(2.6)
Good	30	(1.8)	32	(2.7)
Very good	29	(2.6)	22	(2.6)
Excellent	10	(3.5)	6	(1.5)
Grades 9-12				
Very poor	2	(0.5)	1	(0.3)
Poor	4	(0.4)	4	(0.8)
Fair	14	(2.0)	18	(1.8)
Good	36	(2.0)	39	(2.2)
Very good	33	(2.5)	31	(2.1)
Excellent	11	(1.1)	8	(1.1)

* p < 0.05

[§] Only classes using published textbooks/programs were included in these analyses.

Table 5.4
Teachers' Perceptions of Quality of Textbooks/Programs
Used in Mathematics Classes,[§] by Grade Range: 1993 and 2000

	Percent of Classes			
	1993		2000	
Grades 1-4				
Very poor	3	(1.4)	1	(0.5)
Poor	4	(0.6)	3	(1.0)
Fair	21	(1.9)	17	(2.3)
Good	32	(2.4)	34	(2.8)
Very good	30	(3.5)	38	(2.9)
Excellent	10	(1.5)	7	(1.3)
Grades 5-8				
Very poor	0	(0.7)	2*	(0.7)
Poor	5	(0.7)	5	(1.3)
Fair	20	(3.2)	16	(1.7)
Good	32	(2.7)	33	(2.4)
Very good	31	(2.7)	33	(2.6)
Excellent	14	(1.8)	10	(1.9)
Grades 9-12				
Very poor	1	(0.3)	1	(0.2)
Poor	3	(0.7)	3	(0.6)
Fair	11	(1.1)	19*	(1.7)
Good	30	(2.7)	34	(2.1)
Very good	38	(1.8)	34	(2.1)
Excellent	16	(1.7)	9*	(1.2)

* p < 0.05

[§] Only classes using published textbooks/programs were included in these analyses.

As noted earlier, the percentage of lessons incorporating student use of computers has not changed since 1993. However, the percentage of classrooms using computers at some point during the course has risen, both in mathematics (ranging from 44 percent to 77 percent in 1993, and from 60 percent to 88 percent in 2000), and more dramatically in science (ranging from 40 percent to 52 percent in 1993, and from 71 percent to 91 percent in 2000). (See Tables 5.5 and 5.6.) This increase is complemented by the sharp decrease in teachers reporting that computers are needed but not available. Only 3–6 percent of science and 2–5 percent of mathematics teachers now express a lack of this equipment, compared to 18–36 percent and 12–29 percent in 1993. It is interesting to note that more mathematics teachers in grades 5–8 and 9–12 indicated in 2000 that computers were not necessary for their instruction (18–35 percent) than did so in 1993 (12–29 percent), perhaps because of greater use of calculators for data manipulation, graphing, and analysis.

There have been similar increases in use of other instructional equipment and technologies. The most dramatic change occurs in the rise of CD-ROM use across all levels in both science and mathematics. In 1993, use of this medium ranged from 7 to 10 percent of science classes and from 1 to 3 percent of mathematics classes. (See Tables 5.5 and 5.6.) By the 2000 survey, use had grown to 52–59 percent of science classes and 22–53 percent of mathematics classes. This jump is also interesting considering the percentage of teachers in 1993 who said this equipment was not needed for instruction (60–65 percent in science, 81–88 percent in mathematics) as well as the percent who indicated CD-ROM players were needed, but not available that year (25–33 percent in science, 12–16 percent in mathematics). By the 2000 survey, teachers indicating that this equipment is not needed for instruction decreased to 34–43 percent in science and 42–75 percent in mathematics. Likewise, availability had increased a great deal, with only 5–8 percent of science and 3–6 percent of mathematics teachers reporting the equipment was needed, but unavailable. Evidently, not only are more teachers interested in using this technology in their instruction, but also more of such equipment is available for their use.

In nearly every instance, the percentages of both science and mathematics teachers reporting equipment unavailability has declined notably since 1993.

Table 5.5
Equipment Usage in Science Classes, by Grade Range: 1993 and 2000

	Percent of Classes					
	Used		Not Needed		Needed, But Not Available	
	1993	2000	1993	2000	1993	2000
Grades 1–4						
Videotape player	88 (2.0)	90 (1.7)	9 (1.3)	8 (1.3)	2 (0.7)	2 (1.1)
Overhead projector	74 (2.8)	89* (2.2)	21 (2.9)	11* (2.2)	6 (1.3)	0* (0.2)
Videodisc player	18 (1.6)	26* (3.1)	59 (1.9)	67* (3.1)	23 (2.5)	7* (1.6)
CD-ROM player	10 (1.5)	52* (3.7)	65 (2.4)	43* (3.5)	25 (2.7)	5* (1.2)
Four function calculators	31 (2.8)	33 (3.1)	57 (1.7)	64 (3.2)	12 (2.0)	3* (1.1)
Fraction calculators	2 (0.6)	2 (0.8)	88 (1.5)	94* (1.3)	10 (1.5)	4* (1.1)
Graphing calculators	0 (0.2)	1* (0.4)	89 (1.9)	96* (1.1)	11 (1.6)	3* (1.1)
Scientific calculators	0 (2.6)	2 (0.7)	88 (2.4)	96* (1.3)	12 (1.6)	3* (1.1)
Electric outlets in labs/classrooms	51 (2.6)	88* (2.2)	32 (2.2)	11* (2.1)	17 (2.3)	1* (0.5)
Running water in labs/classrooms	49 (2.7)	79* (2.5)	28 (2.2)	14* (2.2)	24 (1.9)	7* (1.2)
Gas for burners in labs/classrooms	7 (2.1)	7 (1.4)	73 (3.0)	85* (2.3)	20 (2.1)	8* (1.8)
Hoods or air hoses in labs/classrooms	3 (1.6)	3 (0.9)	79 (2.5)	92* (1.7)	18 (1.6)	6* (1.3)
Computers	52 (2.4)	71* (3.0)	30 (1.8)	26 (3.2)	18 (2.2)	3* (1.4)
Calculator/computer lab interfacing devices	13 (1.8)	7* (1.5)	64 (1.9)	87* (2.0)	23 (1.9)	6* (1.1)
Grades 5–8						
Videotape player	94 (1.1)	94 (1.6)	6 (1.0)	6 (1.6)	1 (0.3)	0* (0.4)
Overhead projector	88 (1.5)	92 (2.0)	10 (1.2)	8 (1.8)	2 (0.6)	0* (0.3)
Videodisc player	27 (2.5)	47* (3.4)	49 (3.3)	42 (3.2)	24 (2.1)	11* (1.9)
CD-ROM player	10 (2.0)	59* (3.0)	60 (2.9)	34* (3.2)	30 (2.4)	7* (1.5)
Four function calculators	34 (3.0)	62* (3.0)	60 (3.3)	34* (2.9)	7 (1.0)	3* (1.1)
Fraction calculators	8 (1.5)	17* (2.8)	81 (2.2)	79 (3.1)	11 (1.3)	4* (1.3)
Graphing calculators	2 (1.0)	12* (1.7)	86 (1.8)	80* (2.0)	13 (1.3)	8* (1.7)
Scientific calculators	6 (1.3)	29* (2.7)	81 (2.1)	67* (2.6)	13 (1.4)	4* (1.0)
Electric outlets in labs/classrooms	75 (2.3)	96* (1.0)	10 (1.5)	4* (1.0)	15 (1.8)	0* (0.2)
Running water in labs/classrooms	70 (2.7)	91* (1.9)	7 (1.3)	3* (0.7)	23 (2.6)	7* (1.8)
Gas for burners in labs/classrooms	28 (3.1)	36 (2.9)	42 (3.0)	53* (3.0)	30 (2.7)	11* (2.0)
Hoods or air hoses in labs/classrooms	13 (3.3)	22* (2.7)	52 (3.0)	64* (2.9)	35 (2.5)	15* (1.8)
Computers	50 (3.0)	91* (1.5)	21 (2.5)	6* (1.4)	29 (2.4)	3* (0.8)
Calculator/computer lab interfacing devices	18 (3.2)	28* (2.8)	41 (2.8)	56* (3.2)	41 (3.0)	16* (2.0)
Grades 9–12						
Videotape player	90 (1.8)	95* (0.9)	8 (1.4)	5 (0.9)	2 (0.3)	0* (0.1)
Overhead projector	83 (2.6)	88 (2.7)	14 (2.8)	12 (2.7)	3 (0.9)	0* (0.1)
Videodisc player	29 (2.1)	55* (2.4)	47 (3.1)	39* (2.1)	24 (2.0)	7* (1.2)
CD-ROM player	7 (1.4)	57* (2.5)	60 (3.2)	36* (2.3)	33 (3.3)	8* (1.2)
Four function calculators	38 (2.2)	59* (2.3)	54 (2.6)	37* (2.3)	8 (2.1)	5 (0.9)
Fraction calculators	11 (1.1)	27* (2.7)	83 (1.9)	70* (2.8)	6 (1.3)	4 (1.1)
Graphing calculators	7 (1.4)	35* (2.6)	82 (1.6)	60* (2.7)	11 (2.1)	5* (0.9)
Scientific calculators	38 (2.1)	58* (2.6)	53 (2.9)	38* (2.6)	9 (1.8)	4* (0.9)
Electric outlets in labs/classrooms	94 (0.9)	97* (0.9)	4 (0.9)	2 (0.7)	2 (0.8)	1 (0.7)
Running water in labs/classrooms	90 (2.7)	96* (0.9)	3 (0.8)	2 (0.7)	7 (2.5)	2* (0.4)
Gas for burners in labs/classrooms	67 (2.7)	72 (2.1)	24 (3.1)	22 (2.0)	9 (1.0)	5* (1.0)
Hoods or air hoses in labs/classrooms	36 (2.1)	56* (2.4)	38 (2.3)	33 (2.0)	26 (2.3)	11* (1.4)
Computers	40 (2.5)	85* (1.7)	24 (2.2)	9* (1.3)	36 (2.1)	6* (1.0)
Calculator/computer lab interfacing devices	18 (1.2)	42* (2.5)	37 (1.6)	40 (2.7)	46 (1.9)	18* (2.1)

* p < 0.05

Table 5.6
Equipment Usage in Mathematics Classes, by Grade Range: 1993 and 2000

	Percent of Classes					
	Used		Not Needed		Needed, But Not Available	
	1993	2000	1993	2000	1993	2000
Grades 1-4						
Videotape player	42 (2.8)	45 (3.3)	54 (2.7)	54 (3.3)	4 (1.0)	1* (0.3)
Overhead projector	78 (3.2)	92* (1.7)	15 (2.1)	7* (1.6)	8 (1.7)	1* (0.4)
Videodisc player	8 (1.0)	10 (1.8)	80 (2.2)	87* (2.0)	12 (1.8)	3* (0.9)
CD-ROM player	3 (0.8)	53* (2.9)	81 (1.9)	42* (2.8)	16 (2.1)	6* (1.6)
Four function calculators	50 (2.5)	70* (2.6)	34 (2.2)	28 (2.4)	16 (1.1)	2* (1.1)
Fraction calculators	3 (0.7)	4 (1.1)	85 (1.6)	89 (1.8)	13 (1.6)	7* (1.5)
Graphing calculators	1 (0.3)	2 (0.8)	88 (1.4)	93* (1.3)	12 (1.8)	5* (1.1)
Scientific calculators	1 (0.4)	4* (1.1)	90 (1.2)	92 (1.6)	9 (1.7)	4* (1.2)
Computers	77 (2.1)	88* (2.0)	11 (1.4)	10 (1.9)	12 (1.8)	2* (0.7)
Calculator/computer lab interfacing devices	33 (2.4)	23* (2.5)	46 (3.0)	69* (2.8)	21 (2.3)	9* (1.7)
Grades 5-8						
Videotape player	44 (2.8)	48 (2.3)	51 (2.7)	51 (2.2)	5 (2.4)	1 (0.4)
Overhead projector	79 (3.7)	91* (2.2)	16 (2.3)	9* (2.2)	5 (2.5)	0* (0.2)
Videodisc player	5 (1.0)	10* (1.9)	80 (2.9)	84 (2.3)	15 (2.4)	6* (1.3)
CD-ROM player	3 (0.9)	39* (3.3)	84 (1.8)	57* (3.2)	13 (1.8)	4* (0.8)
Four function calculators	72 (3.0)	82* (1.8)	17 (2.2)	16 (1.8)	11 (2.9)	1* (0.5)
Fraction calculators	26 (2.3)	54* (2.8)	35 (2.2)	39 (3.0)	39 (2.9)	7* (1.1)
Graphing calculators	5 (1.0)	26* (2.2)	66 (3.0)	66 (2.7)	30 (2.7)	9* (1.6)
Scientific calculators	22 (3.0)	49* (3.1)	61 (3.4)	46* (3.1)	17 (2.0)	6* (1.4)
Computers	60 (3.1)	78* (2.6)	12 (1.3)	18* (2.4)	29 (3.1)	4* (0.9)
Calculator/computer lab interfacing devices	26 (2.0)	29 (2.4)	35 (2.4)	56* (2.8)	39 (3.1)	14* (2.0)
Grades 9-12						
Videotape player	38 (2.1)	42 (2.2)	57 (1.7)	57 (2.2)	5 (1.2)	0* (0.1)
Overhead projector	76 (2.9)	88* (1.5)	20 (2.3)	12* (1.5)	5 (1.2)	0* (0.3)
Videodisc player	2 (0.7)	4 (1.0)	88 (1.6)	94* (1.2)	10 (1.4)	3* (0.7)
CD-ROM player	1 (0.3)	22* (2.2)	88 (1.4)	75* (2.2)	12 (1.3)	3* (0.8)
Four function calculators	65 (2.3)	65 (1.9)	30 (2.2)	34 (1.9)	5 (1.3)	1* (0.3)
Fraction calculators	28 (2.3)	61* (2.1)	53 (1.7)	38* (2.1)	19 (2.2)	1* (0.4)
Graphing calculators	40 (2.3)	77* (2.0)	40 (1.6)	20* (1.9)	20 (1.9)	2* (0.9)
Scientific calculators	67 (2.0)	78* (1.6)	27 (2.1)	21* (1.6)	6 (1.2)	1* (0.3)
Computers	44 (2.4)	60* (2.3)	29 (1.8)	35* (2.2)	28 (2.4)	5* (0.9)
Calculator/computer lab interfacing devices	21 (2.1)	32* (2.2)	43 (2.0)	58* (2.5)	36 (2.7)	10* (1.1)

* p < 0.05

Tables 5.7 and 5.8 compare the amount of money per student schools indicated spending on instructional materials in 1993 and 2000. The actual dollar amounts reported in 1993 are given along with those numbers adjusted for inflation into 2000 dollars.[‡] Based on these adjusted figures, per pupil spending for equipment has decreased from 1993 to 2000 in middle and high school science and in elementary school mathematics.

The amount of money spent in science programs on consumable supplies in middle and high schools has increased. This increase may be due to the influence of the NRC *Standards*, with more schools purchasing instructional programs emphasizing hands-on activities. However, as mentioned earlier in this report, teachers are not reporting an increase in the use of such activities in their science classes. Additionally, the amount of money schools spent on software for their science programs has dropped in all three school levels.

Table 5.7
Median Amount Schools Spent Per Pupil on Science Equipment, Consumable Supplies, and Software, by School Type: 1993 and 2000

	Median Amount		
	1993	1993 Adjusted	2000
Elementary Schools			
Equipment	\$ 1.06	\$ 1.26	\$ 1.10
Consumable Supplies	\$ 0.51	\$ 0.61	\$ 0.79
Software	\$ 0.09	\$ 0.11	\$ 0.00*
Middle Schools			
Equipment	\$ 1.78	\$ 2.12	\$ 1.10*
Consumable Supplies	\$ 0.88	\$ 1.05	\$ 1.33*
Software	\$ 0.16	\$ 0.19	\$ 0.00*
High Schools			
Equipment	\$ 2.11	\$ 2.51	\$ 2.05*
Consumable Supplies	\$ 2.22	\$ 2.65	\$ 3.12*
Software	\$ 0.25	\$ 0.30	\$ 0.19*

* $p < 0.05$

[‡] CJR Dollar Conversion Calculator (www.cjr.org/resources/inflater.asp).

Table 5.8
Median Amount Schools Spent Per Pupil on Mathematics Equipment, Consumable Supplies, and Software, by School Type: 1993 and 2000

	Median Amount		
	1993	1993 Adjusted	2000
Elementary Schools			
Equipment	\$ 1.40	\$ 1.67	\$ 0.99*
Consumable Supplies	\$ 1.00	\$ 1.19	\$ 1.58
Software	\$ 0.46	\$ 0.55	\$ 0.66*
Middle Schools			
Equipment	\$ 1.00	\$ 1.19	\$ 1.16
Consumable Supplies	\$ 0.40	\$ 0.48	\$ 0.94
Software	\$ 0.49	\$ 0.58	\$ 0.14
High Schools			
Equipment	\$ 0.87	\$ 1.04	\$ 1.32
Consumable Supplies	\$ 0.38	\$ 0.45	\$ 0.61*
Software	\$ 0.22	\$ 0.26	\$ 0.18

* p < 0.05

Tables 5.9 and 5.10 report the percentage of schools that made some purchase of instructional materials in the previous year. In light of the data presented earlier in this chapter that showed an increase in the availability and use of computers, the lack of significant increase in the amount of money spent on software, in general, and the decrease in middle schools, seem odd. The inclusion of suites of software with computer purchases as well as the proliferation of educational sites on the Internet and free program downloads may account for these seemingly contradictory observations.

Table 5.9
Schools Purchasing Science Equipment, Consumable Supplies, Software, or Any Purchase in Previous Year, by School Type: 1993 and 2000

	Percent of Schools			
	1993		2000	
Elementary Schools				
Equipment	83	(4.9)	75	(3.5)
Consumable Supplies	85	(5.9)	83	(2.7)
Software	53	(5.0)	48	(4.0)
Any purchase	92	(4.5)	89	(2.2)
Middle Schools				
Equipment	84	(5.7)	70*	(4.0)
Consumable Supplies	88	(6.0)	84	(3.3)
Software	56	(5.1)	43*	(3.6)
Any purchase	89	(5.8)	87	(2.9)
High Schools				
Equipment	94	(2.2)	83*	(3.4)
Consumable Supplies	98	(1.8)	96	(1.7)
Software	64	(2.9)	58	(4.1)
Any purchase	100	(1.5)	97	(1.6)

* p < 0.05

Table 5.10
Schools Purchasing Mathematics Equipment, Consumable Supplies,
Software, or Any Purchase in Previous Year, by School Type: 1993 and 2000

	Percent of Schools			
	1993		2000	
Elementary Schools				
Equipment	85	(4.7)	78	(3.8)
Consumable Supplies	85	(3.7)	90	(2.4)
Software	74	(3.5)	65	(4.3)
Any purchase	94	(3.3)	94	(1.9)
Middle Schools				
Equipment	85	(5.1)	84	(3.0)
Consumable Supplies	79	(5.9)	89	(2.4)
Software	69	(4.3)	52*	(4.3)
Any purchase	91	(3.7)	96	(1.7)
High Schools				
Equipment	87	(3.2)	85	(3.1)
Consumable Supplies	79	(3.4)	86	(2.3)
Software	63	(3.0)	56	(3.7)
Any purchase	93	(2.8)	98	(0.6)

* p < 0.05

Given the picture of school-wide expenditure painted by the previous tables, it is not surprising that teachers are still spending a good deal of their own money to augment their classroom instruction. (See Table 5.11.)

Table 5.11
Amount of Own Money Science and Mathematics Teachers
Spent on Supplies Per Class, by Grade Range: 1993 and 2000

	Median Amount		
	1993	1993 Adjusted	2000
Science			
Grades 1-4	\$ 30	\$ 36	\$ 35
Grades 5-8	\$ 50	\$ 60	\$ 50*
Grades 9-12	\$ 50	\$ 60	\$ 55
Mathematics			
Grades 1-4	\$ 50	\$ 60	\$ 46*
Grades 5-8	\$ 50	\$ 60	\$ 50*
Grades 9-12	\$ 25	\$ 30	\$ 50*

* p < 0.05