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AUTHOR Radlick, Michael
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ABSTRACT

Technology tools are critical to the restructuring of teaching and learning. This report describes the level of access and degree of use of technology in New York State public schools, and is based on the most current information available. It provides a point of reference for New York relative to the information presented in the Office of Technology Assessment's national report. The number of microcomputers in schools has steadily increased over the past 10 years, and comparisons are made on the number of "old" and "new" computers. The 1994-95 school year ratio of students to microcomputers of 10.3 to 1 reflects a significant change from the 1985-86 ratio of 24 to 1, and a slight decrease from the 1993-94 ratio of 11.1 to 1. Data indicates that student computer use has increased slightly, but that teacher use of both computers and televisions for classroom instruction has decreased. Of the total 1992-93 school expenditures of more than $21 billion across 717 public school districts, $360 million was spent on technology. Three tables present New York state's ranking relative to the other 49 states and the District of Columbia in terms of the level of access or availability of different computer and video technology resources: computers; CD-ROMs; LANs (Local Area Networks); modems; video disk players; VCRs; video tapes; cable TV; and satellite. (MAS)

Where are We?

A Status Report on Technology in New York State Public Schools

1994-1995 School Year

The Office of Elementary, Middle, Secondary and Continuing Education
Technology Services
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A Status Report on Technology in New York State Public Schools 1994-1995 School Year

Introduction

Technology tools are critical to the restructuring of teaching and learning. As the Congressional Office of Technology Assessment's recent publication *Teachers and Technology--Making the Connection* (1995) highlights, teachers and students need both access to the technology and support in the use of that technology in the classroom:

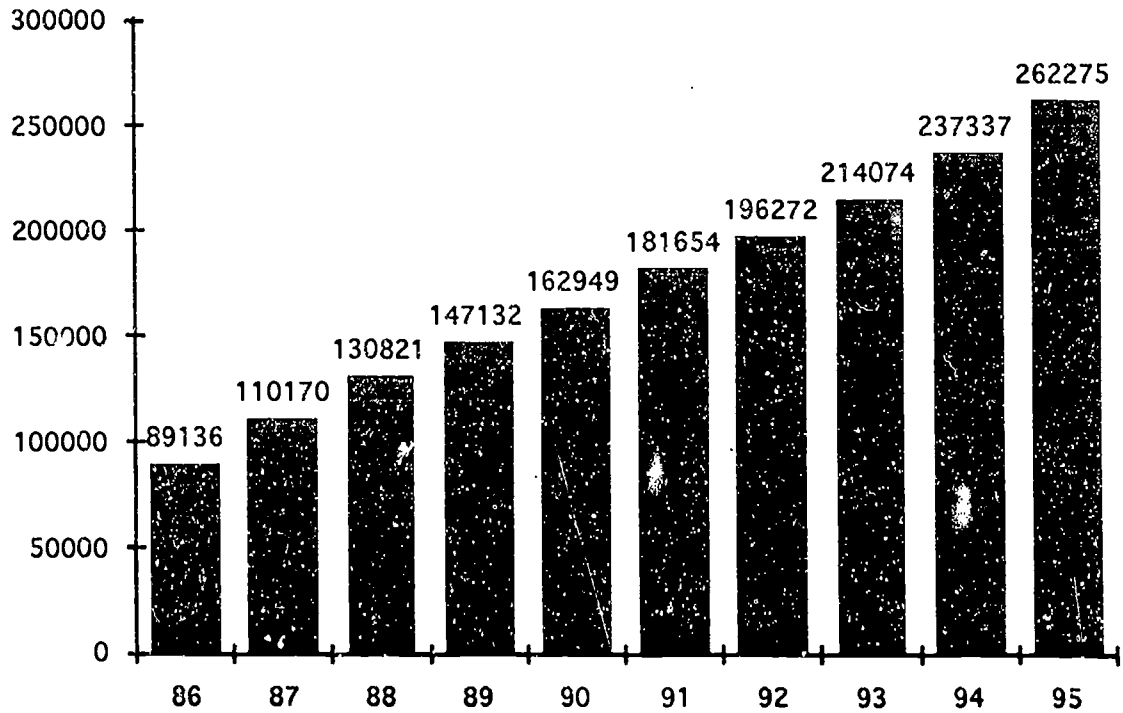
> *To use technologies well, teachers not only need access to them, they also need opportunities to discover what the technologies can do, learn how to operate them, and experiment with ways to apply them. (p.6)*

The following report describes the level of access and degree of use of technology in New York State public schools, based on the most current information available. This report provides a point of reference for New York State schools relative to the picture painted of all the nation's schools in the Office of Technology Assessment's report.

Level of Access to Computers and Other Technology Resources

The first graph shows the growth in the total number of microcomputers in public schools over the past 10 years (1985-86 school year to 1994-95 school year). As shown, the number of microcomputers in schools has steadily increased each year over the past 10 years.

Graph 1
Number of Microcomputers in New York State Public Schools
1985-86 to 1994-95 School Years



Of the total of 262,275 microcomputers in New York State public schools this year, 97,548 are classified as newer computers. Of the remaining 164,727 older computers, 101,198 are Apple II's, with the remainder of "old" microcomputers made up of Commodore, TRS-Tandy and unclassified machines. The percentage of total microcomputers in any year which are "newer" type machines has increased over the past three years from 26.2 percent in 1992-93 to 32.4 percent in 1993-94, and is now 37.2 percent in 1994-95. This categorization of "newer" microcomputers is important because only newer machines are capable of running the more powerful, multimedia applications now available for students and teachers.

The following table (Table 1) presents a count of technology resources and the ratio of students to resources for all the 3,905 public schools in New York State in 1994-95. These figures are based on the preliminary K-12 enrollment count of 2,710,937 students. The overall ratio of student to microcomputer (10.3 to 1) reflects a significant change from the 24 to 1 ratio of the 1985-86 school year, and a slight decrease from the 11.1 to 1 student to microcomputer ratio of the prior (1993-94) school year.

Table 1
Technology and Other Resources in K-12 Public Schools
Count and Ratio of Students to Resource

Learning Resource	Statewide Total in 1994-95	Ratio of Student to Resource
Older Micros	164,727	20.5 to 1
Newer Micros	97,548	27.8 to 1
All Micros	262,275	10.3 to 1
Laser Printers	8,350	324.7 to 1
CD-ROMs	13,381	202.6 to 1
VCR's	33,377	81.2 to 1
TV's	45,866	59.1 to 1
Books	42,322,776	1 to 15.6

Table 2 presents the number (and percent) of public schools with at least one of each technology resource across three years (1992-93, 1993- 94 and 1994-95).

Use of Technology in Schools

Table 3 provides information on the use of computer and television technology in schools over the past three school years. These data indicate that student computer use has increased slightly, but that teacher use of both computers and televisions for classroom instruction has decreased. The decrease in teacher use of televisions during the 1994-95 school year is the second year of decrease and may reflect the gradual displacement of learning time by other factors, including computers. Computer technology offers a means to more actively engage students in the learning process--an approach which is much more consistent with the general restructuring efforts under way in education. This decline in more traditional video services needs to be examined over time, and related to other factors in the commitment of classroom time.

Table 2
Change in Technology Resources
Number of Schools and Percent of All Schools in State
K-12 Public Schools
(1992-93 to 1994-95)

Technology Resource	92-93 # of Schools Having Resource	Percent (%)	93-94 # of Schools Having Resource	Percent (%)	94-95 # of Schools Having Resource	Percent (%)
Older Micros	3,796	97	3,779	97	3,761	96
Newer Micros	3,176	81	3,405	87	3,555	91
Any Micro	3,895	99	3,892	99	3,921	99
Laser Printers	1,990	51	2,415	62	2,716	70
CD-ROMs	1,545	40	2,189	56	2,764	71
VCR's	3,709	95	3,723	95	3,781	97
TV's	3,860	99	3,864	99	3,893	99
Cable TV Access	2,802	72	2,908	74	3,096	79
Public TV Access	3,371	86	3,384	87	3,436	88
Satellite Dishes	101	3	125	3	205	5
Involved in Distance Learning	400	10	516	13	530	14
Computer in School Library	2,836	73	3,027	77	3,247	83
Computer in School Library with Modem	1,224	31	1,390	36	1,756	45
On-line Public Access to Library Catalog	429	11	578	15	771	20

Note that the number of schools in each year was 3,906 (1992-93) 3,906 (1993-94) and 3,905 (1994-95). In addition there were approximately 110 special schools each year which are not reflected in these statistics since comprehensive technology and other demographic data are not collected from them.

Table 3
Technology Use
in
Public Schools

Regular Technology Use	Percentage Use in 1992-93	Percentage Use in 1993-94	Percentage Use in 1994-95
Student Computer Use	69 percent of all students	72 percent of all students	72.6 percent of all students
Teacher Computer Use	47 percent of all teachers	50 percent of all teachers	47.9 percent of all teachers
Teacher TV Use in Classroom	48.2 percent of all teachers	47.7 percent of all teachers	45.4 percent of all teachers

Technology Expenditures

Based on an analysis of the most current fiscal expenditure data available to the Education Department (official 1992-93 school district end-of-year expenditure reports), it is possible to determine the extent to which school districts commit their fiscal resources from all sources toward technology. Specifically, of the total school expenditures across the 717 public school districts in 1992-93 ($21,320,000,000), schools spent a total of $360,373,546 for technology. This expenditure included both management and instructional technology applications and encompassed hardware, software, network, staffing and BOCES services. This $360 million aggregate technology expenditure was divided in the following way:

- Instructional Technology $293,246,745
- Management Technology $67,126,801

The statewide average expenditure for districts was 2.2 percent of their total budget for technology (instructional and management combined). This ranged from 0 to 8.0 percent. The median was 2.15 percent of total budget. In examining the distribution of spending by districts, the top 10 percent of districts spent 3.3 percent or more of their total budget on technology. The top 2 percent of districts in the distribution spent 4.4 percent or more of their total budget on technology. The bottom 10 percent of school districts in the statewide distribution spent 1.1 percent or less of their total budget on technology. The bottom 2 percent of districts spent 0.36 percent or less of their total budget on technology. Districts spent an average of 1.9 percent of their total budget for instructional technology. This ranged from 0 percent to 8.0 percent.

Of the total spent on technology ($360 million), $65,727,016 was spent on BOCES technology services with slightly over half of this $65 million for management technology services.

In comparing the technology expenditures of school districts, it is important to note that business and industry typically spend four to six percent of their total budgets on technology, and information intensive industries spend even more. Based on these statistics, New York State schools under-spend for technology, compared with other enterprises. At this point in time, no other state has been able to provide comparable expenditure data on technology in order to determine where New York State public schools stand relative to the rest of the nation.

Comparisons with Other States

The following tables (Tables 4-6) present New York State's ranking relative to the other 49 states and the District of Columbia when examining the level of access or availability of different technology resources. All the comparative statistics in these tables are from a Quality Educational Data (QED) report titled *Technology in Public Schools*, 1993-94. This QED report provides the most current comparative data on technology in each of the 50 states and the District of Columbia. As shown, New York ranks fairly well in terms of access to computer technology. For example, New York ranks sixth in terms of percent of buildings with CD--ROMs, a critical technology for support of interactive, multimedia educational learning. New York State's low ranking in terms of video disk piayers or satellite dishes is a reflection of special legislative programs in many states which were targeted at getting particular technologies such as these into 100 percent of the buildings in a state. New York State has not directed funding in this manner for particular technologies.

Table 4
New York State's National Ranking
on Technology Resource Availability

Computer Technology	
Microcomputers (Number of students per computer)	18
CD-ROMs (Percent of buildings with CD-ROMs)	6
LANs (Percent of buildings with LANs)	19
Modems (Percent of buildings with Modems)	33
Video Technology	
Video Disks (Percent of buildings with Video Disk Players)	46
VCRs (Number of students per VCR)	50
Video Tapes (Video tapes per VCR)	44
Cable TV (Percent of buildings with Cable TV)	16
Satellite (Percent of buildings with satellite dishes)	46

Table 5
Greater Detail on National Comparisons
Computer Technology

Computers

New York has 4.9 percent of the U.S.'s schools, 6 percent of the students, and 6.8 percent of the computers

The number of students divided by the number of computers in New York State is 12.3. This is a rank of 18.

The top 5 highest ranked states are Wyoming (8.1), Alaska (8.6), Kansas (9.9), Iowa (10.2) and Nebraska (10.4).

CD-ROMs

New York has 40.6 percent of its schools with CD-ROMs. This is a rank of 6.

The five highest ranked states (with the percentage of the schools in that state with CD-ROMs) are Utah (49.2 percent), Iowa (47.8 percent), Arizona (45.5 percent), Maryland (43.4 percent) and South Dakota (42.9 percent).

LANs

New York has 25.7 percent of its schools with LANs. This is a rank of 19.

The five highest ranked states are Utah (40.7 percent), Georgia (39.5 percent), Arizona (35.4 percent), North Dakota (35.0 percent), and Wyoming (34.3 percent)

Modems

New York has 36 percent of its schools with modems. This is a rank of 33.

The five highest ranked states are District of Columbia (91.2 percent), Alaska (54.6 percent), Texas (50.1 percent), Ohio (46.9 percent), and North Carolina (46.4 percent)

All statistics from Quality Educational Data (QED) report *Technology in Public Schools*, 1993-94.

Table 6
Greater Detail on National Comparisons
Video Technology

Video Disk

New York has 8.1 percent of its schools with video disk players. This is a rank of 46.

The five highest ranked states are Florida (98.1 percent), Texas 54.8 percent), Utah (37.5 percent), Washington (31.5 percent) and Wyoming 31.2 percent).

VCRs

New York is ranked 50 in terms of the number of students per VCR. The five highest ranked states are the District of Columbia (1), Ohio (2), Nebraska (3), Wyoming (4), and Alaska (5).

Video Tapes

New York is ranked 44 in terms of the number of videotapes per VCR. The five highest ranked states are the District of Columbia (1), Florida (2), Maryland (3), Kansas (4), and Utah (5).

Cable TV

New York has 73.4 percent of its schools with cable television. This is a rank of 16.

The five states with the highest ranking are Connecticut (88.5 percent), Massachusetts (87.8 percent), Hawaii (86.9 percent), Rhode Island (85.7 percent), and Colorado (83.7 percent).

Satellite

New York has 2.1 percent of its schools with satellite dishes. This is a rank of 46.

The five states with the highest ranking are Missouri (45.6 percent), Kentucky (40.0 percent), Montana (35.2 percent), Arkansas (34.4 percent), and Idaho (30.6 percent).

All statistics from Quality Educational Data (QED) report *Technology in Public Schools*, 1993-94.

Conclusions

Student and teacher access to technology continues to increase in New York State public schools. As the most recent Education Department statistics show, the quantity of microcomputers continues to increase, as it has for the past 10 years. There has also been a significant increase in the number of CD-ROMs in schools over the past three years, with over a 100 percent increase just in the last year. Nonetheless, the level of access for teachers and students is not what it needs to be if technology is to be fully integrated into the teaching and learning process. *The Long-Range Plan for Technology* (1990) envisioned five computer workstations in each classroom, with network connections within schools and from each school out to the wide area network. Data on the number of microcomputers indicate that New York is nowhere near the goal of five computers for each of the 187,000 public school classrooms in the State. Although detailed information on the level of internal and external networking of schools is not available at this point in time (although the item is being added to the Basic Educational Data Survey for this next year), the recent National Center for Educational Statistics study of K-12 networking indicates that approximately 3 percent of classrooms in the nation have network connections. In light of the goal to have workstations and network connections in the classroom, as reflected in *The Long-Range Plan for Technology* , most schools still have a long way to go. Keeping in mind that the majority of computers in schools are older, less capable machines only makes the picture worse.

The situation is even more disturbing if the level of access to technology resources is analyzed in terms of the percentage of minority students in a school. At the time this report was being prepared, the 1994-95 school year data breakdown by percentage of minority students was not yet available. However, analyses over the past two years have shown that higher minority schools have fewer computer resources and those computers in high minority school buildings are older (and therefore less capable). This issue of equity of access is particularly disturbing when we consider that these same minority students tend to have more limited access to computers and other learning technology in their homes as well as their schools. New York State will need to develop policies and funding programs to address this inequity. Schools also will need to address the issue of increasing teacher and student access to technology through a variety of means, including seeking out alternative funding sources, developing new partnerships with community business and industry representatives, and taking advantages of special purchasing arrangements. The end result must be a higher percentage of total school budgets going toward technology, or the technology will never make significant in-roads into the school.

It should be noted that New York State has the most extensive longitudinal information on technology implementation of any state in the country. The State Education Department has been collecting technology information from schools for over 10 years through the Information Center on Education. The majority of data in this report are from the Department's Basic Educational Data System (BEDS), which collects a wide range of information each fall from all school districts and buildings.

For More Information
Contact the Author:
Dr. Michael Radlick
New York State Education Department
Office of Technology Services
(518) 473-9106