



# Learning Through Technology

ITEC 2000

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“Technology -- properly managed and applied - provides the opportunity to restore rigor to children’s learning, to rebuild public confidence in American education, and to help ensure that the equality of opportunity in which we pride ourselves as a nation has meaning.”

Lowell Milken, June 1998

I. Research on tech in teaching and learning

II. Technology in The New Economy

III. The Connecticut picture

IV. Challenges and opportunities

### I. Early research shows that technology works for learning

A 1994 meta-analysis (Kulik, 1994) of some 300 studies of computers and learning found that students using computer-based instruction:

- ➡ Scored higher on tests of achievement
- ➡ Learned more in less time
- ➡ Liked their classes more and developed a more positive attitude toward learning.

It also found that computers did not achieve these kinds of results in all areas in which they were studied.

### But context matters...

A review of 219 studies from the period of 1990 to 1997 (Sivin-Kachala, 1998) found that students in technology-rich environments from preschool to college:

- ➔ Experienced positive effects on achievement in all subject areas. Positive attitudes toward learning also increased.

The studies also showed that the effectiveness of technology for learning is influenced by the **student population**, the **software used**, the **educator's role**, and the level of **student access to the technology** itself.

### Software-based higher order learning techniques promote mathematics achievement.

In 1998, Wenglinsky looked at the impact of simulation software and higher order learning techniques on math outcomes among 4th and 8th graders taking the NAEP exams. He found that:

- ➔ Higher order use of computers and professional development resulted in higher math achievement for both 4th and 8th grade students.
- ➔ 8th grade students show gains on NAEP math scores of 15 weeks above grade level.
- ➔ 8th graders whose teachers received professional development on technology gained 13 weeks.

### **The bottom line: Impact of technology on learning**

Research continues to show that technology can improve achievement and increase positive attitudes about learning. But ...

- ➔ Students and teachers need access to technology.
- ➔ Teachers need training in technology.
- ➔ Student learning gains related to technology are context sensitive.

### **Technology for Learning: National Center for Education Statistics 1999 survey of technology use in K-12 education**

Note: 99% of all teachers in the 1999 national survey reported access to computers or the Internet *somewhere in the school building*. This does not mean that all teachers, or all students, have access to technology in the classroom.

## Technology for Learning: National Center for Education Statistics 1999 survey of *teacher* technology use

Among *teachers* nationally who, in the spring of 1999, reported using computers and technology “a lot”:

39% used it for creating materials

34% used it for record keeping

23% used it for communication with colleagues

16% used it for gathering information for lessons

6-8% used it for communication with students & parents, accessing model lesson plans, and research on best practices.

## Poverty levels matter...

<u>Teacher Use</u>	<u>Low Poverty</u>	<u>High Poverty</u>
Create materials	52%	32%
Record keeping	43%	24%
Peer Communication	31%	19%
Info for lessons	20%	15%
Best practices research	9%	7%
Student/Parent Comm	9%	5%

### Teacher years of experience matter...

<u>Teacher Tech Use</u>	<u>3 or fewer years</u>	<u>20+ years</u>
Create materials	43%	35%
Record keeping	38%	30%
Peer communications	30%	19%
Planning lessons	21%	11%
Best practices research	11%	5%
Student/Parent communications	6%	5%

### Types of *student* learning assignments

Across these teachers, 66% used technology for *students'* *classroom* assignments as follows:

Applications**	41%
Drill and practice	31%
Internet research	30%
Multi-media reports	24%
Simulations	17%.

\*\*e.g., word processing/spreadsheets

### **Student assignments by school poverty level**

	<u>Low Poverty</u>	<u>High Poverty</u>
<u>Student research</u>		
with the Internet	39%	18%
with a CD-ROM	32%	19%
<u>Creating presentations</u>		
Multi-media	29%	22%
with graphics	26%	19%
<u>Using learning tools</u>		
Drill and Practice	26%	35%
Software applications	55%	31%
Simulations	22%	16%

### **The bottom line: Use by teachers and students**

Teachers who use technology a lot employ it more for preparing materials, tracking student progress and communicating with colleagues than for **creating multi-media presentations, acquiring model lesson plans, communicating with students and parents, learning about best practices on teaching.**

The use of **simulations by students** accounts for less than 1/5 of all technology applications across all districts.

## The bottom line: Use by teachers and students

The economic level of the district influences how teachers and students use technology as does length of teaching experience:

More poverty=lower use. Longer tenure=less use.

Students in poor districts are engaged in drill and practice more than any other use of technology.

“In the corporate world and the education world alike, the key is using technology, and the expansive resources it makes available, to improve performance and more efficiently achieve concrete objectives.

The challenge of integrating technology and measuring...results... is not unique to the education community. For decades, corporate America has steadily increased the presence and use of technology internally and with customers and vendors.”

[www.edvancenet.org](http://www.edvancenet.org)

“For most of the 20th century, the vitality of the US economy was determined by the success of its major manufacturing industries.”

“In the old economy, states prospered by having workers who were skilled with their hands and who could reliably work in repetitive and often physically demanding jobs.”

*Source: The State New Economy Index: Benchmarking Economic Transformation in the States  
July 1999*

“Today, information, technology, communications, and intellectual capital, rather than energy and raw materials, power business.”

“In the New Economy, states will prosper if their workers are good with their minds.”

*Source: The State New Economy Index: Benchmarking Economic Transformation in the States, 1999*

## What is the New Economy?

“It is a knowledge and idea-based economy where the keys to wealth and job creation are the extent to which ideas, innovation, and technology are embedded in all sectors of the economy.”

*Source: The State New Economy Index:  
Benchmarking Economic Transformation in the States  
July 1999*

## II. Nationally, information technology (IT) is both the engine and the fuel for economic growth.

In 1970, investment in IT business equipment accounted for 7% of all capital spending. In 1998, it reached 50%.

As a share of GDP from 1994 --1998, IT was responsible for 1/3 of the total real growth in the US economy.

In 1999, American consumers spent \$20 billion online. In 2004, they will spend an estimated \$184 billion, an increase of 900%.

*Sources: National Governors' Association:Remaining Vibrant in the New Economy, 1999; The Forrester Group, 2000*

Internet and technology growth will continue at a dramatic pace and will require an increasingly well-educated workforce.

The number of US households connected to the Internet will increase from **44.4 million** in 2000 to **60 million** in 2003.

Businesses will send out more than 200 *billion* marketing and customer support email messages in 2004.

By 2006, 49% of all private sector employees will work in industries that produce or are heavy users of IT equipment or services.

Sources: National Governors' Association: *Remaining Vibrant in the New Economy*, 1999; The Forrester Report, *Net Policy and the Candidates*. March 2000

### III. The Connecticut Picture

While Connecticut ranks 5th best in the nation on overall New Economy measures, it also ranks 42nd out of 50 states in the infusion of technology into our K-12 schools

98% of CT districts report having formal technology plans, but 78% also report that their plans are not fully funded. Most of CT's districts report no increase in technology funding as a proportion of the district's school budget.

Source: *The State New Economy Index: Benchmarking Economic Transformation in the States July 1999; Year 2000 SDE Draft State Technology Plan, April 2000.*

## Technology access and support in Connecticut's schools

Half of the districts report having no hardware replacement policy and one quarter of the districts report that they have no tech support personnel in-district.

Across 2/3 of the districts, an average of 2.5 positions support operation of the district's technology.

In 24 CT districts, there is no technology leadership assigned at all.

## Technology access and support in Connecticut's schools

In a 1999 CAFE survey, only 15 to 27% of CT districts indicated that they regularly employ distance learning technologies.

Based on 1998 data, CT lagged behind the nation in classroom access to the Internet (34% v. 44%) and in the proportion of districts in which 1/2 or more of the teachers have Internet access (22% v. 39%).

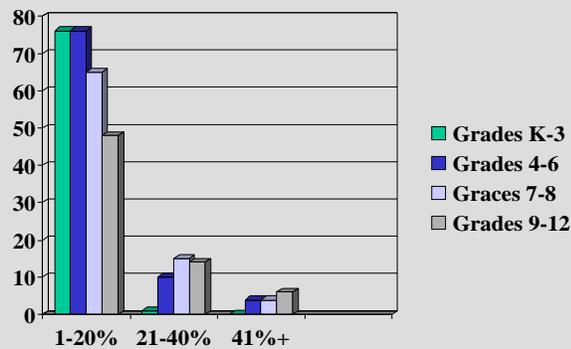
*Sources: 1999 CAFE Survey of Educational Technology, January 1999;  
Technology Counts '98 published by EdWeek.*

## Technology infrastructure in CT schools

The 1999 CABE report also showed that:

- 40% of districts had technology with an up-to-date OS
- 21% of CT classrooms had outside telephone access
- 25% had adequate electric outlets
- 37% had a local area network
- 20% had a wide area network.

## Weekly use of technology in terms of instructional time in CT schools



## Patterns of CT technology use by grade

Type of Use	<u>K-3</u>	<u>4-6</u>	<u>7-8</u>	<u>9-12</u>
Drill	82%	79%	60%	40%
Problem Solving	71%	84%	81%	69%
Reference	60%	90%	85%	72%
Creativity	90%	87%	74%	57%

Source: 1999 CAFE Survey of Educational Technology, January 1999

## Student outcomes related to technology use at school

The CAFE 1999 survey also found that:

- ➔ 23% to 40% of districts report increased technology-enhanced student interaction and communications among students in grades K-8.
- ➔ 20% to 22% of districts report increased outside-of-school academic work across grades 7-12.
- ➔ 40 to 45% of districts report greater engagement in learning across grades K-12.
- ➔ One quarter to one third of districts report increased student subject knowledge across K-12.

### CT's Bottom Line:

Progress and resource allocations  
in the use of technology  
for Connecticut's K-12 public schools  
are not *yet* sufficient  
to match the pace of technology change  
and the workforce demands of our  
current economic environment.

### IV. Challenges and Opportunities

CT's digital divide  
Resumption of state funding  
New education-business partnerships  
Statewide bi-partisan leadership  
A stronger commitment to  
teacher professional development  
Recognition of student technology excellence

### Two final notes:

1. CT's workforce for the next 20 years has already been born. Many of these young people are already in our educational institutions.
2. Using technology to its best advantage in education requires a dramatic change in our pedagogy. Unless we transform our thinking about *education* as we are expanding technology resources in our schools, our technology investment will not live up to its potential.

### CT Voices for Children

*is a 501-c-3 organization  
dedicated to policy advocacy and citizen action  
on behalf of CT's children and families*

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