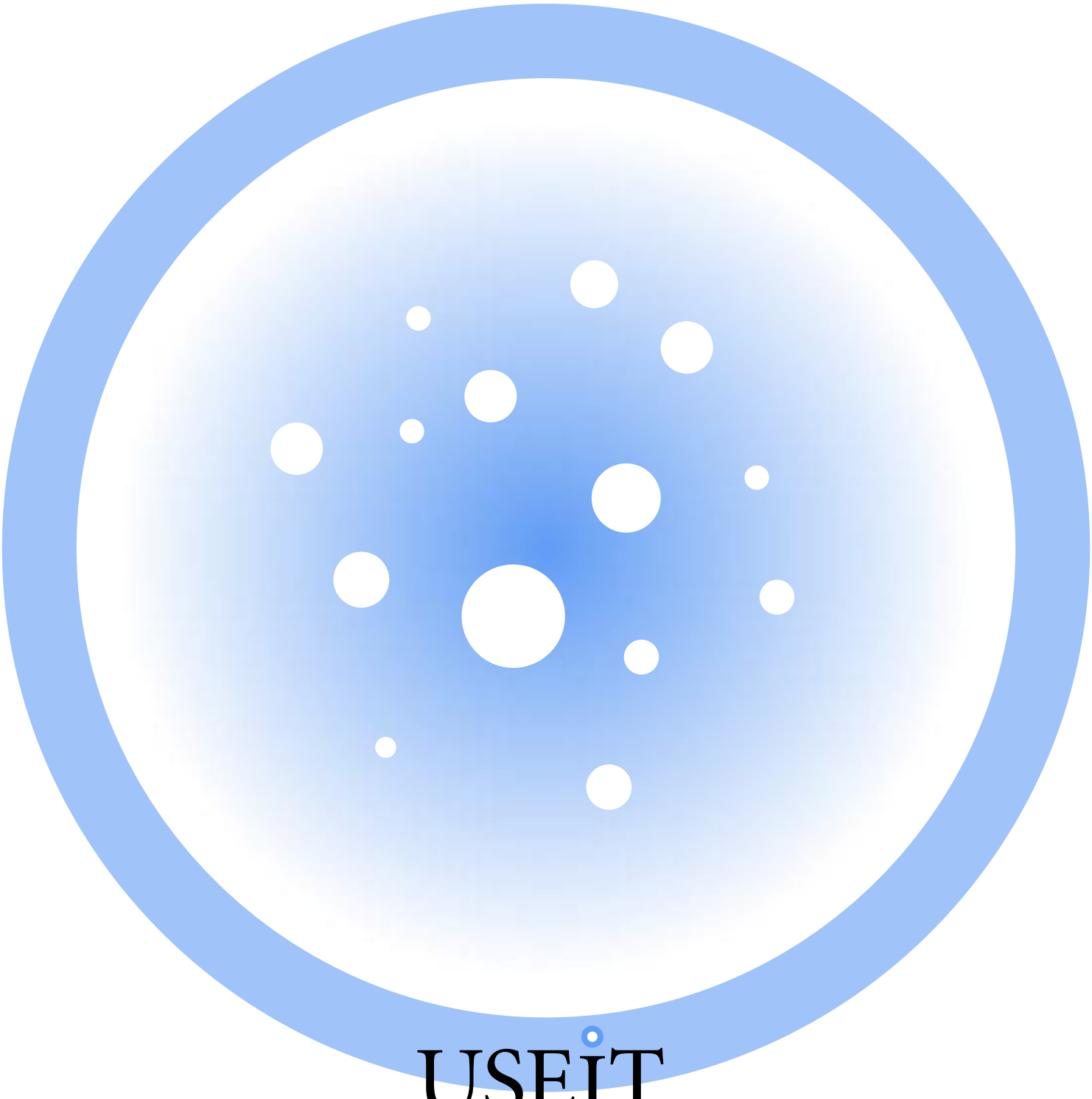

USEiT

Use,
Support,
and
Effect
of
Instructional
Technology
Study

report one

An Overview of the USEiT Study and the Participating Districts

Report 1

An Overview of the USEIT Study and the Participating Districts

Michael Russell , Damian Bebell, & Laura O'Dwyer

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Michael K. Russell, Project Director/Boston College

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USEIT

Use, Support, and Effect of Instructional Technology Study

Report 1
An Overview of the Study and the Participating Districts

Over the past decade, expenditures on, access to, and use of computer-based technologies by school-aged children have increased sharply. Between 1995 and 2001, federal expenditures on educational technology increased from $21 to $729 million while the student to computer ratio has decreased from 9:1 to 4:1 nationally (Glennan & Melmed, 1996; Market Data Retrieval, 1999, 2001). In 2001, the U.S. Census Bureau's Current Population Survey reported that American children between ages 9-17 use computers more than any other reported subgroup of the American population (92.6%) (A Nation Online, 2002).

Despite these large expenditures, this increased access, and nearly universal use by school-aged children, several observers have questioned the extent to which technology is impacting teaching and learning. In 1997, Oppenheimer argued that there is no solid evidence that computers have improved student performance, as measured by test scores. Others, like Stoll (1999) and Healy (1998), have criticized investments in educational technologies arguing that there is little evidence that they impact teaching and learning in a positive way and, in fact, asserted that computer use may be harming children and their learning. More recently, Cuban (2001) argued that computers have been oversold as a vehicle for reforming educational practices and are generally underused as an instructional tool by teachers at all levels of education.

While it is certainly appropriate to question the effects computer-based technologies are having on teaching and learning, the data collected to date provide incomplete, and sometimes misleading images of the ways teachers and students use technology, the effects of these uses, and the factors that influence these uses. To deepen our understanding of these issues, the Technology and Assessment Study Collaborative (inTASC) at Boston College undertook a three-year study of technology use, support, and impact across 22 districts located throughout Massachusetts.

Introduction to the USEIT Study

The Use, Support, and Effect of Instructional Technology (USEIT) Study was undertaken to better understand:

a) how educational technologies are being used by teachers and students in the classroom,

b) what factors influence these uses, and

c) how the use of technology effects student learning.

The three-year study began during the Spring of 2001 and was divided into two phases.

During the first phase (2001-2002 school year), information about district technology programs, teacher and student use of technology in and out of the classroom,

and factors that influence these uses were collected through site visits and surveys. In total, survey responses were obtained from 120 district level administrators, 122 principals, 4,400 teachers, and 14,200 students in Grades 5, 8, and 11.

During the second phase (2002-2003 school year), four case studies and a study focusing on the relationship between student use of technology and academic performance will be conducted.

Although the data collected during the first phase of this study were not designed to be representative of all districts in Massachusetts or of districts across the nation, the data represent the largest and most comprehensive data set related to the support and use of technology in schools collected to date. This study also provides the first data set that links information provided by students with information provided by their teachers, their principals, and their district leaders. Thus, this study is the first opportunity to understand how factors that operate at the student, teacher, school, and district level interact to influence the ways and the extent to which teachers and students use technology in school.

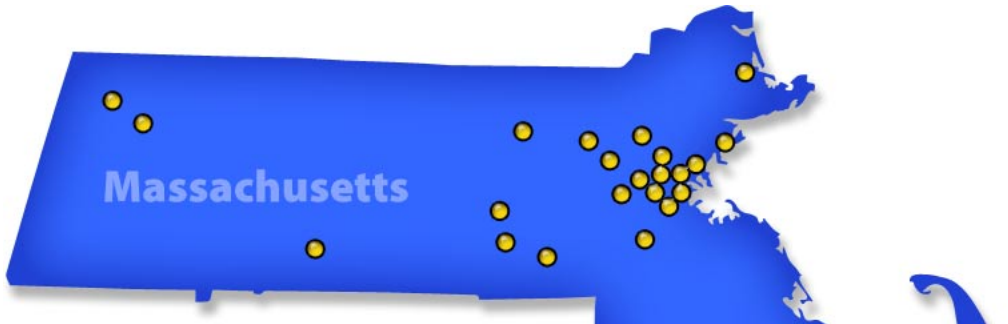
To provide school leaders, teachers, policy makers, and the general public with timely information about the use of technology in schools and the various factors that influence teacher and student use of technology in the classroom, inTASC will be releasing a series of reports based on the survey and site visit interview data collected during the first phase of this study. Like this document, the series of reports will be available on-line in pdf format (www.intasc.org). The focus of the reports will range from descriptive analyses of student, teacher, principal, and district-level beliefs and practices to more sophisticated analyses that explore the influence various factors have on teacher and student use of technology. The purpose of the current report is to provide readers with a sense of why the study was conducted, how it was conducted, and who participated.

Characteristics of the Study Districts

This study was spawned by an inquiry from a group of districts located in the greater-metropolitan area surrounding Boston, Massachusetts. This group of districts asked the project director to develop a multi-district research plan that focused on how technology was being used to impact learning and how to maximize investments in technology. The proposed plan was submitted to and ultimately generously funded by the Office of Educational Research and Improvement's Field Initiated Studies Program.

To increase the diversity of districts participating in the study, 12 Massachusetts school districts that were not part of the original group of districts were asked to participate. Of these, 11 opted to participate. Thus, when data collection began, the study included 22 districts located throughout Massachusetts. Of these, three are considered small urban districts, five are rural, and the remaining 14 are suburban. Figure 1, below shows the geographic location of the participating school districts.

Figure 1 Geographic Locations of the USEIT Participating School Districts



Arlington
Ashburham/ Westminster
Bedford
Belmont
Brookline
Concord/Carlisle
Everett
Hampden/ Wilbraham
Ipswich
Mohawk Trail
Mount Greylock
Newton
Northbridge
Norwood
Shrewsbury
Sutton
Swampscott
Waltham
Watertown
Weston
Winchester

Background

Throughout the first phase of the study, districts were actively engaged in developing and piloting survey instruments. Through survey review meetings, district representatives have critiqued and informed the development of all teacher, principal and student survey items. To increase response rates and to provide teachers with ample time to complete the surveys, participating districts agreed to administer all teacher surveys during a faculty or department meeting. Student surveys were administered during the first 15 minutes of a class period (usually during English class). District leaders were asked to complete their respective surveys at a time of their choosing. Copies of the principal, teacher, and student surveys will be found in the forthcoming technical report available on the inTASC web site.

In addition to the surveys, a two-day site visit was conducted in each participating district. During each site visit, district-level leaders were interviewed. A minimum of one elementary, one middle, and one high school per district was also visited. At each school, the principal, librarian, and a technology specialist were interviewed. In the high school, the mathematics, science, social studies and English department heads were also interviewed. All interviews focused on issues related to the support and use of technology in the district.

It should be noted that before the data were analyzed to answer the primary research questions, each district was provided complete copies of their summary statistics for all teacher and student survey items, as well as the raw data collected from teachers and students. In addition, a half-day workshop that focused on understanding, using, and interpreting their data was held in each district.

It also should be noted that our research has been greatly aided by the thoughtful advice and suggestions made by the USEIT Study Advisory Board. The Advisory Board has met twice, once in the Fall of 2001, when instruments were being developed, and again in the Fall of 2002, when preliminary analyses were beginning. The Advisory Board members included Hank Becker, Chris Dede, David Dwyer, Cheryl Lemke, and Linda Roberts.

Research Questions Addressed During Phase One (2001–2002 School Year)

The research conducted as part of this study builds on prior research by focusing on the relationships among different types of district level supports, classroom practices, and impacts on student outcomes. Specifically, the surveys incorporate several scales developed by Becker and his colleagues (1999) so that we can examine relationships among pedagogical beliefs, instructional practices, school climate, and instructional uses of technology. Recognizing the relationship between classroom and student-level factors (such as prior experience with computers) and instructional uses of technology documented by Schofield (1995), a portion of our student surveys focus specifically on documenting students' prior home and school computer experiences, and how these experiences shape instructional uses of technology in their classrooms. Finally, recognizing that instructional technology programs are influenced by factors that exist at different levels within a school system, multiple approaches to analyzing survey data are being employed. These methods include within-level correlational and regression analyses, across-level hierarchical linear modeling (HLM), and structural equation modeling (SEM) methods.

This study employs common data collection instruments and procedures across the 22 school districts to examine the effects different district level technology support structures have on teaching and learning. Among the several specific questions addressed in phase one are:

- How and to what extent are teachers and students using technology in and out of the classroom?
- How much influence does district leadership, shared vision, provision of resources, and technical support have on the ways in which and extent to which teachers use technology for instructional purposes?
- How do different approaches to professional development impact instructional uses of technology?

To address these questions, surveys and site visits were used to collect information about several factors related to technology in schools. These factors include:

District Vision for Technology
School and District Culture
Leadership
Technology Resources
Technology Support
Professional Development
Technology Policies and Standards
Technology Beliefs
Non-instructional Uses of Technology
Teaching Philosophy/Instructional Model
Equity
Community
Demographic Information
Instructional Uses of Technology
Physical Infrastructure
Barriers to Use
Teacher Preparedness

Although each of the first 13 factors is believed to impact instructional uses of technology (either positively or negatively), the factors reside at different levels of a school system. As Figure 2 depicts, the majority of the factors originate at the district level. At the school level, these district level factors may be moderated by local leadership and culture. At the classroom level, factors internal to the teacher and characteristics of the students may further influence the ways in which technology is and is not used for instructional and preparatory purposes.

Figure 2 Origination of Factors Influencing Instructional Use of Technology

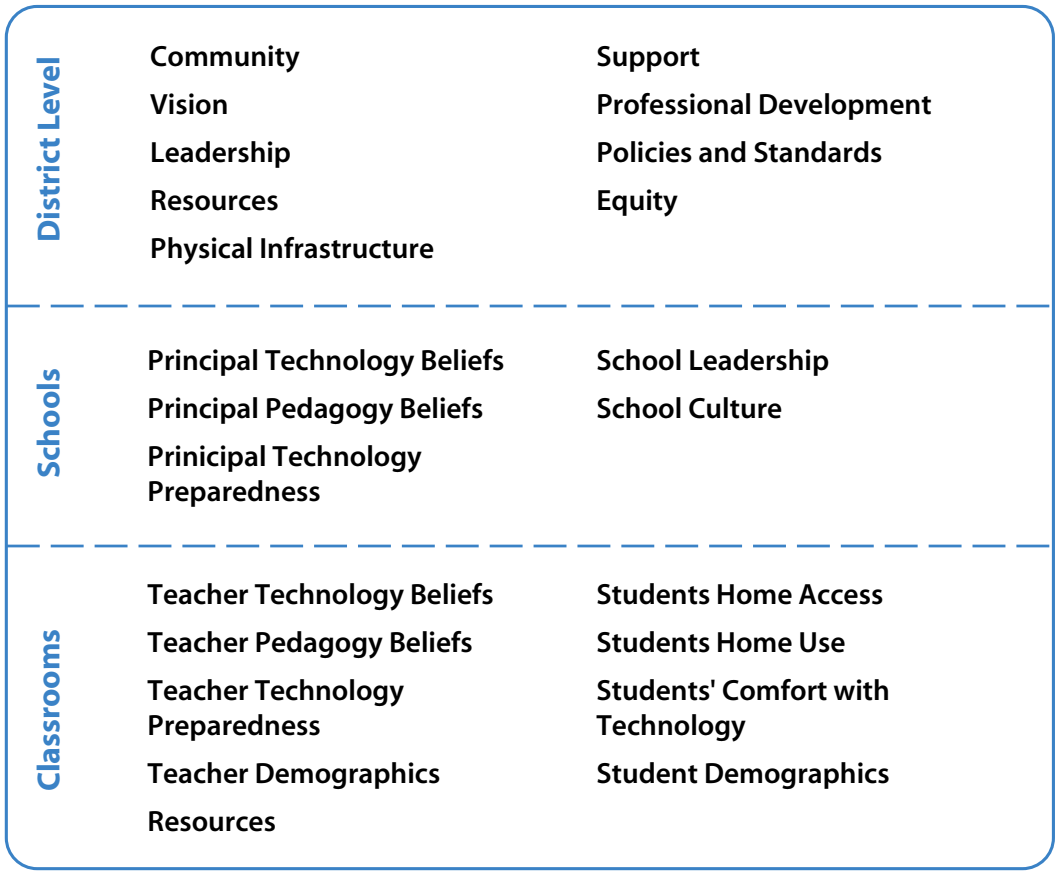


Table 1 indicates how information about each factor was collected. Since many of these factors may play different roles at different levels, information about these factors is collected at multiple levels.

Table 1 Information Collected from Specific Individuals

	Surveys				
	Teacher	Principal	District Leaders	Students	Site Visits
Vision	●	●	●		●
Personal Teaching Philosophy	●	●			
School/District Culture	●	●	●	●	●
Demographics	●	●	●	●	
Professional Development	●	●	●		●
Technology Beliefs	●	●	●		●
Support	●	●	●	●	●
Resources	●	●	●	●	●
Equity Issues		●	●		●
Policies			●		●
Instructional Use	●			●	
Barriers	●	●	●	●	●

Comparing USEIT to National and State Data Sources

The Use, Support, and Effect of Instructional Technology Study was designed to enable intense and sustained investigation of a series of issues across multiple school districts. Many of the issues examined are generally encountered by schools across the nation. The 22 districts that have and continue to participate in this study were selected to allow us easy and extensive access to their schools. When selecting participating districts, we made a concerted effort to include districts in rural, suburban, and small urban settings. In addition, we included districts that were believed to have educational technology programs that were in different stages of development – from very advanced and well established to those that are still being established.

We recognize that districts from across the nation will be interested in using the information provided by this study to inform their own educational technology programs. We also understand that districts will ask how similar the study districts are to themselves. For this reason, we provide several comparisons of the characteristics of the study participants with schools, students, and teachers across the nation. In doing so, we emphasize that we are not attempting to argue that the set of districts that participated in the study are representative of districts across the nation. Rather, we present these comparisons to help readers better understand the characteristics of the study participants and how these characteristics compare with other groups of schools, students, and teachers.

Demographics and Technology Access

Each year the state of Massachusetts provides basic demographic information for each of the 372 school districts operating in the state. In addition the Massachusetts Department of Education's Instructional Technology Group published a "state of the state" report in 2002 which was culled from submitted mandatory school technology plans. When combined, these two sources allow us to compare the participating USEIT districts to the state averages on demographic variables as well as on some technology measures. Table 2 summarizes this information.

Table 2 Selected Demographic Data Comparing USEIT Districts and Massachusetts

District Name	# of Students	Elem. Schools	Middle Schools	High Schools	% White	% Free Lunch	A/B Computers	All Computers
Acton-Boxborough	2,269	0	1	1	88%	1%	6.0	4.1
Acton	2,386	5	0	0	87%	3%	7.1	5.5
Boxborough	634	1	0	0	89%	3%	4.21	4.08
Arlington	4,178	7	1	1	87%	10%	8.1	4.9
Ashburham-Westminster	3,820	3	1	1	96%	7%	–	–
Bedford	2,086	2	1	1	89%	4%	4.6	4.3
Belmont	3,608	4	1	1	86%	7%	11.0	9.2
Carlisle	787	1	1	0	94%	0%	15.13	5.39
Concord	2,063	3	1	0	90%	4%	5.25	4.32
Concord-Carlisle	1,016	0	0	1	86%	4%	6.3	26.9
Everett	5,377	7	0	1	74%	37%	7.15	5.83
Hampden-Wilbraham	3,820	6	1	1	96%	6%	6.85	6.85
Ipswich	1,953	2	1	1	97%	8%	3.5	2.96
Mohawk Trail	1,719	4	0	1	97%	23%	1.17	0.9
Mount Greylock	833	0	0	1	94%	9%	5.05	5.05
Newton	11,248	16	4	2	82%	5%	9.54	6.14
Northbridge	2,422	4	1	1	95%	28%	–	–
Norwood	3,539	6	1	1	87%	9%	6.85	6.85
Shrewsbury	4,512	6	1	1	88%	5%	–	–
Sutton	1,593	2	1	1	99%	2%	–	–
Swampscott	2,379	4	1	1	96%	4%	8.78	8.47
Waltham	5,187	9	2	1	65%	26%	10.5	7.84
Watertown	2,657	3	1	1	92%	19%	6.12	4.18
Weston	2,147	3	1	1	81%	3%	–	–
Winchester	3,285	5	1	1	93%	3%	8.37	6.77
Total USEIT	75,518	103	23	22	89%	9%	7.1	6.5
MASSACHUSETTS	979,593	1270	282	318	76%	25%	5.7	4.8

Data source: Massachusetts Department of Education

Table 2 shows the basic topography of the participating school districts. In most cases, a school district had at least one middle and high school and about five elementary schools. In some cases, a regional high school was shared across two school districts (for example Concord-Carlisle and Acton-Boxborough). The participating USEIT districts differ from the state average on free/reduced lunch participation and ethnic composition. Specifically, the USEIT sample districts are comprised of 89 percent white students compared to the state average of 76 percent. Nine percent of the USEIT district students participate in a free/reduced lunch program compared to the state average of 25 percent. Looking specifically at access to technology in schools, the state reports more computers per students than the USEIT districts report. When examining only A/B type computers[1] the USEIT districts and the Massachusetts averages are 7.1 and 5.7 students per computer, respectively. Across all types of computers this relationship changes little with 6.5 and 4.8 students per computer reported for the USEIT and total state averages, respectively. Thus, the USEIT districts contain less minority and financially burdened students than the state. However, the districts participating in the USEIT study have fewer computers than the state's average.

Student Access To and Use of Computers: Comparison to the Nation

In early 2001, a nationally representative survey was conducted of 7–12th Graders by Harris Interactive, Inc.

Table 3 below outlines the differences between the two data sources.

Table 3 Comparison of USEIT and Harris Data Sources

	USEIT	Harris
Methodology	Questionnaire	Telephone survey
Date of data collection	Spring 2002	January 15–28, 2001
Sample (n)	8,371	500
Sample (Grades)	8th and 11th	7th–12th
Sample (Geography)	Massachusetts	Across USA
Data collected in:	Classroom (School)	Student's home

The two surveys have some overlap in their survey content. In some cases, the questions are nearly identical. In other cases, the questions differ in scale, wording, and tone, yet, the general content is similar enough to allow comparison.

Both surveys addressed students' access to technology at home and the responses were similar. The Harris Poll reported that 94 percent of the surveyed students had *computer access* in their home. Similarly, in the USEIT survey 95 percent of all Grade 8 and 11 students report having a computer at home. Both surveys asked students about their access to the *Internet* in their home. Again, the responses from the two surveys are similar with 88 percent of Harris Poll student reporting Internet access at home and 91.4 percent reporting home access in the USEIT sample.

Both surveys also addressed students' access to technology in their schools. Although most of the items in the two surveys address different topics or were worded differently and do not allow direct comparison, some of the items are similar enough to provide a meaningful comparison. One item asks students about the availability of computers at their school. Table 4 shows the differences in the questions as well as the responses from both survey instruments.

Table 4 Comparison of Ease of Student's Computer Access in School

	USEIT–Student*	Harris*
	When you want to use a computer in school is it…	Which of the following best describes the availability of computers at your school?
Always easy to find a computer	29%	47%
Usually easy to find a computer	44%	43%
Sometimes difficult to find a computer	18%	8%
Always hard to find a computer	7%	2%

* USEIT Study (grades 8 and 11), Harris Poll (grades 7 through 12)

Generally, the USEIT results indicate that students have more difficulty accessing technology in schools as compared to the Harris results. Specifically, 18 percent more students reported that it is "always easy to find a computer" in the Harris Poll than the USEIT survey.

Since both surveys ask students about their use of technology in different subjects it is possible to compare results for English, Math, Science and Social Studies classes. Table 5 shows the percentage of students who use computers across the four main subject areas.

Table 5 Comparison of Student Computer Use in English, Math, Science and Social Studies

	USEIT–Student*	Harris*
	How often do you use a computer in [subject] class?‡	In which of the following classes do you use computers?
English	49%	61%
Math	29%	26%
Science	53%	50%
Social Studies	64%	55%

* USEIT Study (grades 8 and 11), Harris Poll (grades 7 through 12)

‡ The percentage represents students who report using computers a couple of times a year or more.

The above table shows that across the two surveys, student use is very similar in Math and Science, but differs in English and Social Studies. It is important to note that these results do not address the relative frequency of students' technology use in these classes; only whether they have used technology in the class or not. Unfortunately, a more detailed comparison is not possible since the two instruments employ different scales.

Another question that was similar enough to allow meaningful comparison addressed where students use technology the most in their schools. Table 6 displays the frequencies of responses across both samples of students.

Table 6 Comparison of Where Students Use Technology the Most in School

	USEIT–Student*	Harris*
	Where do you use technology (computers, AlphaSmarts, etc.) most in school?	Where do you use computers most often in school?
In the classroom	10%	24%
In a computer lab	68%	39%
In the library/media center	20%	35%

* USEIT Study (grades 8 and 11), Harris Poll (grades 7 through 12)
Note: Table percentages do not equal 100% because of missing data.

Again, there are differences in the school use of technology between the two groups. Specifically, the USEIT 8th and 11th grade students predominately access technology in computer labs (68 percent) while Harris grade 7–12 students use computers more regularly in classrooms and in the library/media center.

These comparisons suggest that the USEIT and Harris samples are quite similar in home access, but differ regarding use of technology in school. Specifically, the Harris study reported greater access to technology in school as compared to the students participating in the USEIT study. Moreover, the USEIT sample appears to lack technology access in the classroom and library as compared to the Harris respondents. With respect to where students learn new things about technology and computers, Table 7 indicates that a higher percentage of USEIT students report learning new things at home as compared to the Harris sample.

Table 7 Comparison of Where Students Learn New Things With Technology

	USEIT–Student*	Harris*
	Where do you usually learn how to do new things with computers?	Where have you learned the most about using computers?
At home	70%	56%
At school	25%	39%

* USEIT Study (grades 8 and 11), Harris Poll (grades 7 through 12)

Teacher Access to Technology

It is also useful to examine how closely the participating USEIT teacher responses resemble teachers access to technology across the nation. Unfortunately, a direct comparison is not possible since no national surveys of teachers' technology access have been conducted recently. However, in Becker's Fall 1998 Teaching, Learning and Computing Survey, 80 percent of teachers reported that they had a computer in their home. Similarly, the 2002 US Census Current Population Survey "A Nation Online," reports that between 1998 and 2002 home access to computers for adults who have earned a college degree has grown at a rate of 5.3 percent per year. Since teachers have college degrees, it is reasonable that their growth rate is similar to 5.3 percent a year.

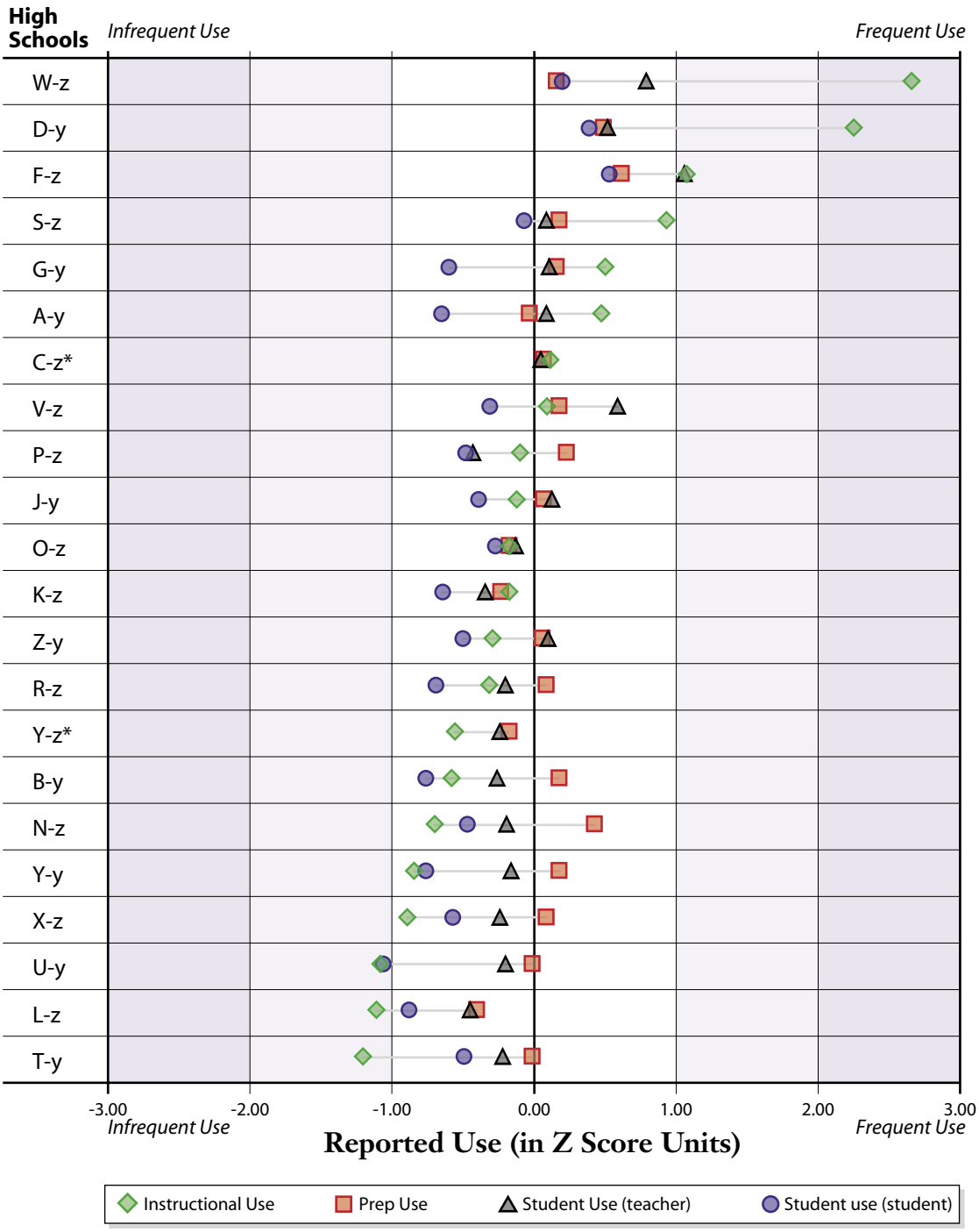
Applying a growth rate of 5.3 percent a year to Becker's findings, one would expect a 15.9 percent increase in the number of teachers who own a computer at home which results in an estimated 95.9 percent of teachers who have a computer in their home. The percentage of USEIT teachers who own a home computer is remarkably similar 95 percent. Although there are no other data that can be compared directly or indirectly to national data sources related to teachers use of computers in or out school, it appears that home access to computers for the teachers participating in the USEIT study is similar to the projected access of teachers nationwide.

Variability Across USEIT Study Districts

As presented above, the USEIT teachers and students appear to have similar access to computers at home as compared to national samples. Students participating in the USEIT study, however, report higher use of computers in school labs and libraries and appear to depend less on school for learning new things about computers as compared to the national data source. Despite these similarities and differences, it is important to recognize that within the USEIT data set, there is significant variation among students, schools, and districts.

As an example, Figure 3 displays four measures of technology usage for each participating high school. These technology uses include teacher use of technology for preparation, teacher use of technology during instruction, student use of technology in the classroom as reported by teachers, and student use of technology in the classroom as reported by students. For each participating middle and high school, the mean for each measure of technology usage is displayed.

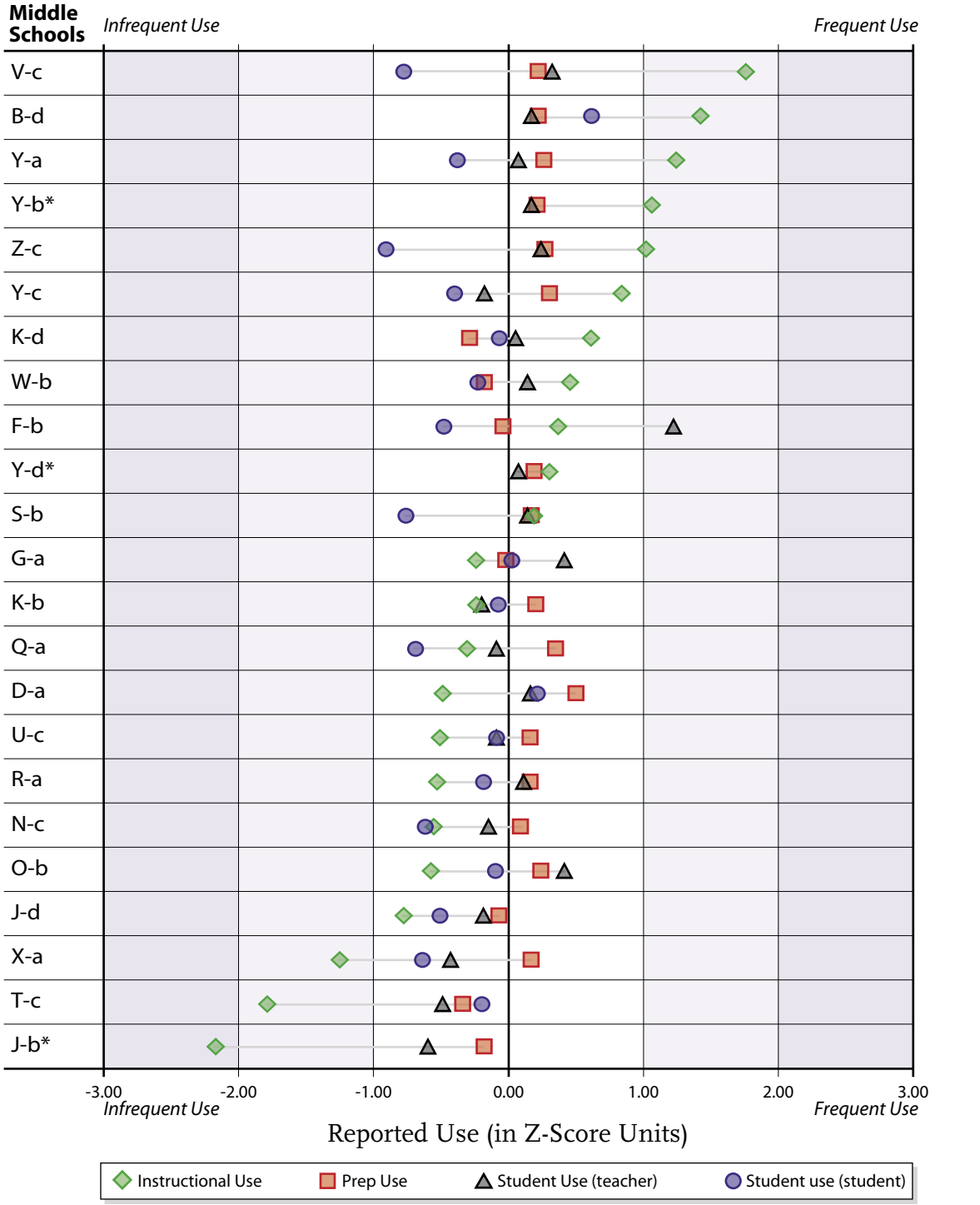
Figure 3 **High Schools' Reported Use of Technology as Reported by Teachers and Students** *(sorted by Instructional Use)*



*data not available for "Student Use" as reported by students
Note: School & District names have been made anonymous to protect the identity of participating districts

As seen in Figures 3 and 4, the extent to which technology is used inside and outside of the classroom varies greatly across schools. From a research perspective, this variation provides opportunities for us to identify factors that influence technology uses (such as teacher beliefs, pedagogical practices, student home use, principal leadership, shared district vision, etc.).

Figure 4 **Middle Schools' Reported Use of Technology as Reported by Teachers and Students** *(sorted by Instructional Use)*



*data not available for "Student Use" as reported by students
Note: School & District names have been made anonymous to protect the identity of participating districts

Summary

In this report we have provided an overview of the research design and presented background information for the 22 participating districts. Comparisons to state and national data were made to provide the reader with a sense of how similar or dissimilar the participating districts are to other districts across the nation. We leave it to the individual reader to determine how similar or applicable our results may be to their respective situations and environment. Although the sample of participating districts was not designed to be representative of districts across Massachusetts or the nation, we believe that the participating districts do not differ greatly from districts that are located in either non-isolated rural areas or in areas that are not large urban areas. In other words, the participating districts should be viewed as a fair cross-section of small urban, suburban and rural communities.

For those readers interested in more detailed information regarding the sample of districts, technical issues regarding survey development and scaling, and technical details of the site visit data collection and coding, this information will be presented in a forthcoming technical report. Following the technical report, a series of reports will be released that focus on specific aspects of the study. The initial set of reports will focus on descriptive results from the surveys and site visits. Additional reports will explore district, school, and classroom-level factors that influence teacher and student use of technology. Together, this collection of reports will help inform a variety of research-based decisions for teachers, administrators, policy makers, and other researchers regarding the use, support, and effect of instructional technology in schools.

Endnote

1 In a 2002 Massachusetts Department of Education report A and B computers were classified the following way: "During the period that this data was collected, Type A computers were defined as machines with 64 MB RAM or higher, which are capable of running multimedia applications, high-end applications, and streamed video. Type B computers were defined as multimedia computers 16 MB RAM to 64 MB RAM, which have CD-ROM access and Internet capability using a browser." (Massachusetts DOE, 2001, p. 5)

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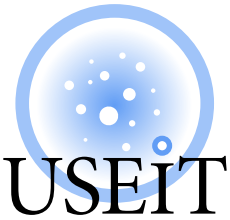
inTASC is a not-for-profit research group that works collaboratively with schools, educational agencies, and businesses to conduct research and development on a variety of issues related to technology and assessment. inTASC brings together researchers who have examined several aspects of technology and assessment in schools over the past decade to focus on new questions and issues that arise from the field. inTASC is unique in that it does not develop research studies and then seek schools to participate in research activities. Instead, schools, educational agencies, and businesses approach inTASC with their own ideas and/or questions that require systematic research to address. Research conducted by inTASC is developed, conducted, and often disseminated in collaboration with our educational and business partners.

inTASC believes that advances in educational technology and continuously emerging applications of those technologies coupled with growing demands to document impacts on teaching and learning requires a dual focus on instructional uses of technology and applications of technology to new forms of assessment. For this reason, inTASC collaborates on research that focuses on instructional uses of technology and on applications of computer-based technologies to the technology of testing and assessment. It is our hope that this dual focus will enable us to provide research-based information to schools and educational leaders about the impacts of educational technology, and to produce new forms of assessment that capitalize on the powers of computer-based technologies and that are more sensitive to the types of learning enabled by educational technologies.



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