CENTER FOR Children & Technology

Rhode Island Teachers and Technology Initiative

Program Evaluation Final Report

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EXECUTIVE SUMMARY

This report summarizes findings from a survey of 570 of the 1,242 elementary, middle, and high school educators who participated in the Pilot and 1998–99 Program implementations of the Rhode Island Teacher Training Initiative (RITTI). All responses were made voluntarily. Pilot-year data was collected at the end of a daylong training conference held at the University of Rhode Island in May 1998; the following year, in May 1999, the same survey was administered to both Pilot and Program participants via mail.

In addition, research staff spent significant time in six schools across the state collecting qualitative data during the course of the 1998–99 academic year. Within this report these data are referenced to illustrate trends that have emerged from the survey data.

Findings

- RITTI educators work in schools which reflect student demographics both state- and nationwide. They are highly educated and very experienced. Nearly 80% of the respondents have earned at least a master's degree, and almost half have taught for twenty years or more.
- RITTI has been highly successful in increasing respondents' confidence with and ability to use a variety of software applications and resources. Respondents report dramatic increases in their ability to make use of email and the Internet (from 43.7% to 99% and from 39.8% to 98.2%, respectively). Nearly all respondents moderately (31.6%) to strongly (62.7%) agree that they now have more confidence in their own capabilities to use technology, a finding consistent with Pilot-year responses.
- RITTI teachers spend significant amounts of time (an average of nearly 13 hours per week) using technology. This time is used primarily for curricular and professional development activities.
- The most highly rated incentives for using computers and the Internet with students include preparing students for life in an increasingly technological society and ensuring that all students have opportunities to gain access to technology resources. Over three-fourths of RITTI educators rate the use of computers as moderately to extremely essential to their teaching.
- A lack of computers connected to the Internet at the classroom level continues to be the number one barrier to the use of use of technology in education.
- RITTI educators report substantial changes in their professional outlook and in their interactions with students and colleagues. Both school-based observations as well as survey data support the finding that since the initiative began, RITTI teachers have become more reflective about their teaching practices and have substantially increased collegial relationships via technology-assisted communication. RITTI educators are more likely to take the role of 'coach' or 'adviser' with their students, and to engage their students in a variety of computer learning activities.
- Both qualitative and quantitative data evidence the increased involvement and impact that RITTI teachers are having on decision-making processes related to technology in their schools and districts. Among the most striking changes are the development of models for integrating computers into the curriculum; as well as the review, selection, and purchase of hardware or software products. In addition, respondents report increased involvement in the development of school- and district-wide policies for computer and Internet use.

In summary, in training approximately 25% of the state's teachers, RITTI has laid a solid foundation which can be effectively leveraged by school communities across the state as they continue the process of building their technology infrastructure.

Background

The Rhode Island Teachers and Technology Initiative (RITTI) is a $5.7 million, three-year effort sponsored by the Rhode Island Foundation, in collaboration with the Rhode Island Department of Education (RIDE) and the University of Rhode Island's School of Education. Since 1997 the program has provided training and laptop computers to approximately 2,400 public school teachers in the state of Rhode Island, representing nearly a quarter of all teachers in the state. The 153 Trainers in this program are teachers from across the state. Microsoft Corporation is a significant partner in this endeavor, having contributed over $1.5 million in software applications.

The Rhode Island Foundation believes that placing teachers at the center of school reform activity is crucial to the improvement of education for students nationwide. Acting upon the conviction that educators are critical catalysts for enabling innovative reforms to take root in schools across the state, the Foundation designed this project to make it possible for individual teachers to:

- Integrate technology into curricula
- Increase and broaden their network of professional and collegial connections
- Enhance their personal and professional productivity through the use of technology.

In its first year, RITTI trained teachers from nearly all of Rhode Island's 327 public schools (Henríquez & Riconscente, 1998). In a state with a total teaching population of approximately 10,000 teachers (RIDE, 1998 Statewide Analysis), RITTI has worked directly with nearly 25% of all public school teachers, reaching "every school system in the state and virtually every household with school-aged children," explains Ronald V. Gallo, the Foundation's President.

This initiative has leveraged the resources of three of the state's most prominent institutions and drawn additional support from a range of corporate and nonprofit organizations from across Rhode Island. The Rhode Island Foundation, the State Department of Education, and the University of Rhode Island share a belief that when teachers are empowered to use technology creatively and critically, the quality of teaching and learning can be vastly improved. This common sense of purpose contributes to the unique strengths of this important collaboration. The management structure of the initiative speaks to the strong cooperative commitment of these three institutions. The program has no single executive director, but is managed through a three-person team of Ted Kellogg (University of Rhode Island), Bill Fiske (Rhode Island Department of Education), and Ron Thorpe (Rhode Island Foundation).

The Foundation has a demonstrated commitment to nurturing and supporting teachers as leaders, and to championing the good work of each and every RITTI participant. The University of Rhode Island's School of Education, the largest state institution engaged in teacher-training, has coordinated the training and ongoing technical and professional support of RITTI teachers, sponsored and maintained the RITTI listserv and Website, and managed repairs and replacement machines to ensure that participants always have a working computer. The State Department of Education has played a critical role in helping to connect RITTI to other technology-based programmatic efforts, including $150,000 in mini-grants offered to schools to pursue technology projects, $6.8 million for additional technology awarded by the State Assembly, and $500,000 from the governor's budget for school-based technology initiatives.

Support from a number of other contributors has made it possible to offer participation in RITTI to more teachers and administrators in the state. These institutions include:

- Bell Atlantic
- Fidelity Foundation
- Bank of Newport
- Washington Trust Company
- The van Beuren Charitable Foundation
- The Semiconductor Industry Association
- Haffenreffer Family Fund at the Foundation

Selecting and Supporting the RITTI Participants

Three different groups of educators have thus far participated in RITTI. Pilot participants began their training the summer prior to the 1997-98 school year; the first Program cohort training was held the following summer. The second Program cohort was selected in the Spring of 1999. This study reports on the Pilot and first Program cohorts. Participants in the second Program training (1999-2000) had not undergone training during the data collection period of the study.

In the Pilot year, applications for the program were disseminated to every teacher in the state via the RITTI project team working with two state teachers' unions. Approximately twelve hundred teachers responded to the initial request; 314 educators were selected to participate in RITTI through a review process conducted by the Rhode Island Foundation staff and representatives of the teachers' unions. Among the criteria considered for selection were demonstrated leadership and a vision of technology integration on the part of individual applicants. Participants were also chosen to ensure representation of different grade levels, content areas, and schools throughout the state. Of the Pilot year applicants, approximately 200 teachers were accepted on a standby basis and guaranteed a place in the 1998-99 Program training. The following year saw triple the number of Rhode Island educators participating in the RITTI experience. These 1998-99 Program participants were selected by the same process as Pilot participants; however, by this time the initiative had become highly visible across the state. According to the 1998 application, the Foundation sought "teachers who express and demonstrate the greatest interest in exploring how technology can help them be better teachers, enhance their professional connections, and improve their personal productivity." Rhode Island staff as well as representatives from one of the state teachers' unions conducted the 1998-99 Program selection process.

RITTI offers educators 60 hours of training over a two-week period during the summer. Pilot year Trainers were selected from participants in the Rhode Island Department of Education's Project SMART. This National Science Foundation–supported initiative had trained a cohort of Rhode Island educators in the use of math, science, and technology resources. For the 1998-99 Program summer training, additional Trainers were drawn from among the RITTI Pilot year participants. The RITTI training focused on helping participants learn to use a variety of software applications (e.g., Microsoft Office), Internet tools such as Web browsers and email programs (e.g., Eudora), and various Internet search engines. Each teacher was required to bring an instructional unit of practice to the training. A key component of the summer session centered on helping teachers integrate technology into this unit. The goal was to give teachers hands-on experience in how to incorporate technology into existing curriculum units and to provide them with activities they could use with their students in their own classrooms. All of these units were subsequently made available on the RITTI website (*The current RITTI site is located at* http://www.ed.uri.edu/rif99/. *To see the 1998 curriculum units, click "RITTI 98"*).

Evaluating RITTI

In January 1998, at the request of the Foundation, the Education Development Center's Center for Children and Technology (CCT) conducted an evaluation of the Pilot year via a survey study. The findings from this survey are reported in *Rhode Island Teachers and Technology Initiative: Findings from the Pilot Implementation Year* (Henríquez & Riconscente, 1998). In order to more fully understand the nuances of RITTI impact on participants' teaching practice, the Foundation and CCT decided to repeat the survey with all RITTI participants in May 1999 as well as to supplement the survey results with school-based observations.

The survey was designed to capture the range of activities in which RITTI participants engage, including their perceptions of the benefits and obstacles to using computers and telecommunications as a professional resource and learning tool. The survey design was informed by focus groups conducted prior to the Pilot year survey implementation and draws heavily on the work of Henry Becker and Jason Ravitz in connection with the National Science Foundation (NSF)–sponsored National School Testbed project (NSF Contract #RED-9454769) and survey questions developed for CCT's NSF-funded Union City Online project (Grant #REC-955-4327).

The resulting questionnaire investigates the following issues:

- Who are RITTI educators? What kinds of schools are they working in, and what grade levels and subject areas do they teach?
- What is their experience and training in computer-based and telecommunications technology?
- What kinds of classroom-based technology activities are participants engaged in, and what are the effects of these activities on classroom practices and teaching strategies?
- What are the perceived effects of technology activities on students' learning, motivation, and work habits?
- What motivated teachers' involvement in RITTI, and how has their participation influenced their role in their school community, their perceptions of their technical capabilities and skills, and their commitment to their professional work?
- What are the barriers to the effective use of computers and telecommunications technologies in RITTI participants' schools?
- What does the technical infrastructure look like at RITTI participants' schools, and what has motivated the development of the schools' technology initiatives?

On May 15, 1998, the end of the Pilot year, CCT staff administered the survey at the end of a one-day conference for RITTI participants at the University of Rhode Island. A total of 183 participants filled out the surveys, representing 58% of Pilot RITTI participants. The survey was administered a second time via mail to all RITTI participants in May of 1999; of the 1,242 Pilot and Program participants who received the survey, 570 responded, a response rate of 46%.

To ensure respondents' anonymity we did not ask teachers to identify themselves by school. Since one educator per school participated in the Pilot year, no individual school is overrepresented within the Pilot, '98 data set. This is not the case for Program year data, since many Rhode Island schools had multiple RITTI participants. It is important to note that these data are self-reported by respondents and may not be entirely accurate representations of school demographics or school technology infrastructures.

In order to supplement and inform our understanding of the survey data, we conducted a series of school-based observations that enabled us to develop a deeper understanding of the ways in which RITTI teachers bring their training experience back to their school communities. In collaboration with the Rhode Island Foundation and the University of Rhode Island, CCT selected six schools that represent a range of grade levels and socioeconomically diverse communities in rural, suburban, and urban school districts across the state. Two each from the elementary, middle, and high school levels participated in this component of the research. Within these schools, individual RITTI participants represent the range of teaching experience and technology background of the overall RITTI population. RITTI participants from the sites include classroom teachers, content-area educators, administrators, library/media specialists, and reading specialists, as well as representatives from the arts and physical education. Their technology experience ranged from expert to novice, with one participant having brought the first computer to her district, and others having no computer experience prior to their participation in RITTI. These educators also represent a range of ages and teaching experience.

The following chart describes the demographics of the observation schools.

School	Number of RITTI Participants	Number of Students	Grades Served	Setting	Number of Staff	% Students Receiving Free or Reduced Lunch
A	19	263	K-4	Rural	22	17%
B	8	390	K-3	Rural	22	16%
C	8	619	5-8	Rural	57	16%
D	5	905	6-8	Suburban	67	6%
E	6	1478	9-12	Urban	110	37%
F	6	1683	9-12	Urban	123	33%

Both elementary schools in the study are located in rural areas and serve small student populations who come from middle- to upper-middle-class families. Although all the schools we visited had multiple teachers involved in RITTI, School A is unique in that nearly all teachers and the principal had participated in the program; in addition, one of the participants at this school is a RITTI Trainer. Eight teachers from School B participated in RITTI as a team in the summer of 1998.

The middle schools we observed differ both in geographic setting and student population. Set close to Rhode Island's coastline, School C is mid-sized, serving students in grades 5 to 8. School D is a large, wealthy, suburban school located on the edge of a major metropolitan area. Eight RITTI participants come from School C, including 1 Trainer; five come from School D, of which 2 are Trainers. Most of the students in both these schools come from privileged communities.

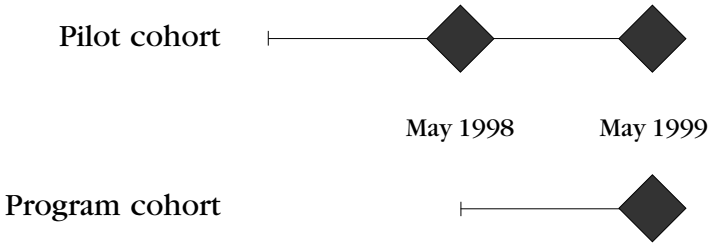
The two high schools we visited are large, urban schools. In terms of demographics, they represent the most diverse student populations in our sample. School E has a student mobility rate of 32% as compared to 17% statewide. Four teachers and two trainers have participated in RITTI from this school. Five teachers and one trainer come to RITTI from School F, which is set in a working-class city.

Over the course of the 1998–99 school year, CCT staff made five visits to each school site. In most cases two researchers participated in each visit. During the visits we talked with RITTI teachers and Trainers, we interviewed principals and other key administrators, and we observed classrooms. We also collected print materials and multimedia products from the sites; these included school publications, assignments, school policy documents, as well as PowerPoint and Web presentations developed by RITTI teachers and their students.

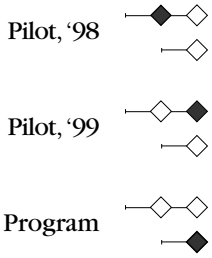
Interpreting the Findings

This report summarizes all the major findings from the May 1999 survey responses, as well as selected comparisons with May 1998 data. Within each section of this document, we report the school-based observation data in the form of vignettes in order to illuminate trends that have emerged in the survey data.

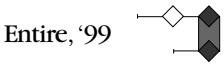
As the diagram below illustrates, the Pilot cohort responded twice to the same survey: once in May 1998 and again in May 1999. From the Program cohort (the 900+ teachers who participated in the 1998-99 full-scale RITTI training) we have one set of data, collected in May 1999.



In the diagram above, each diamond corresponds to a distinct data grouping. In the following diagrams we use the same visual structure to associate each of these groupings with a name, which we use throughout this report.

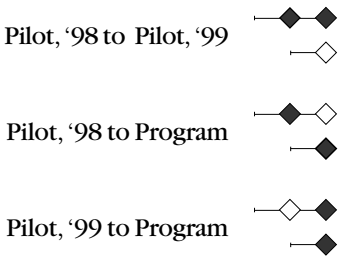


We refer to all the May 1999 data as the Entire cohort. Since these data are a combination, or aggregate, of Pilot and Program participants, they provide a snapshot of ***all*** RITTI participants as of May 1999. We use the following image to refer to the Entire cohort.



In a number of sections in this report, we compare the data from the groupings listed above. There are two primary reasons for making these comparisons. The first is that we can see the impact of the initiative over time by comparing Pilot, '98 responses with Pilot, '99 responses. The second motivation for analyzing differences is to identify characteristics particular to either the Pilot or Program cohort.

Throughout the report, these comparisons are indicated visually as illustrated below.



In the ***Technology Infrastructure in Respondents' Schools*** section we introduce a fourth comparison between the Entire, '99 cohort and the Pilot '98 cohort in order to see overall infrastructure changes in RITTI teachers' schools. For these comparisons we use the following image.

Pilot, '98 to Entire, '99 

Where appropriate we have compared RITTI respondents and the data they report on their school communities and school technology infrastructures with data collected by the National Center for Education Statistics, the Rhode Island State Department of Education, and Rhode Island InfoWorks.

It is the hope of the Center for Children and Technology that the data presented here will be useful to RITTI participants, educators in the state of Rhode Island, and the national community of practitioners and researchers interested in the relationship between technology and school reform.

HOW TO READ THE CHARTS

Most of the charts in this report illustrate data in one of two formats: simple bar charts and range-of-response (known as Likert scale) charts. *Please note that all data used in this section is for explanation purposes only and does not refer to actual data.*

Each chart has a title, labels, and a legend. Except where noted, chart data refers to Entire '99 responses. This is always indicated by a symbol preceding the chart header. The title indicates what value the data in the chart represent. In the case of Figure i, the data refer to the number of computers that respondents have in their classrooms. The labels indicate the response items for each question as well as the percent of survey participants who had each response. Looking again to Figure i, we see that 22.3%, or nearly a quarter, of respondents have between 4 and 7 computers in their classrooms. The number of respondents (n) is indicated for all data reported. For Figure i, the n of 248 is indicated at the top of the chart.

Figure i
Number of Computers in Respondents' Classrooms

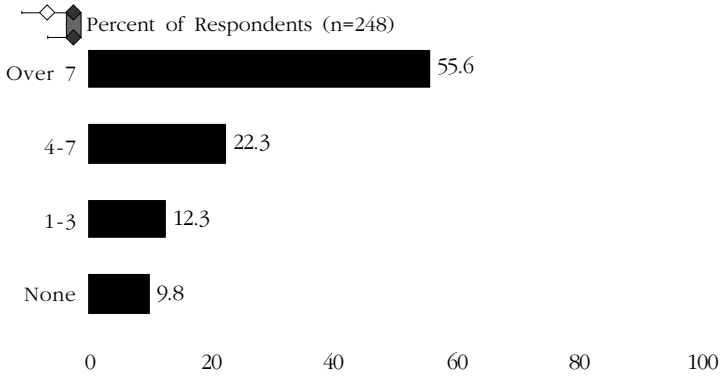
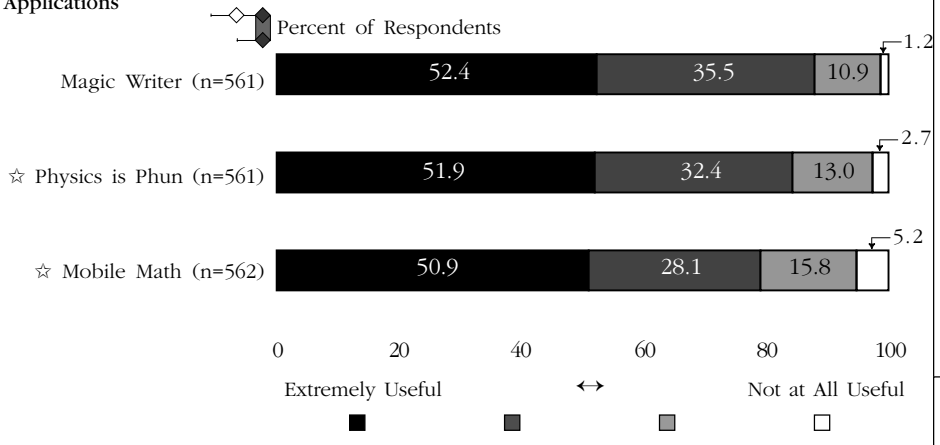
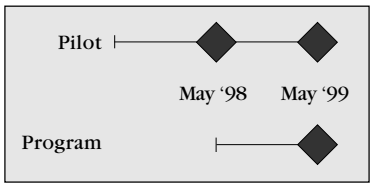


Figure iia is a sample chart of data from the Entire '99 cohort for questions with a range of possible responses (Likert scales). As with the chart in Figure i, a title, legend, and labels describe the data. In this chart type, where a range of responses is possible for each item, an additional legend is placed below the chart to associate the chart 'colors' with values. In Figure ii, therefore, we see that half (50.9%) of the 562 respondents to the Mobile Math item find the application "extremely useful," while only 5.2% do not find it at all useful.

Figure iia
Usefulness of Software Applications

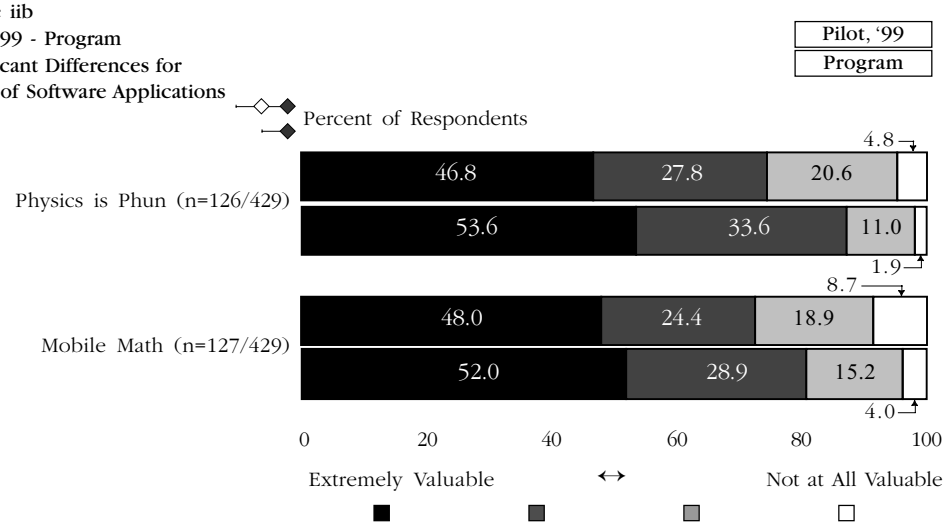


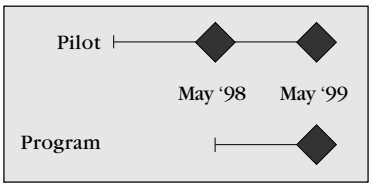


For nearly all items, responses for each distinct data grouping are different. However, variations in exact responses do not necessarily indicate that the differences are *statistically significant* (i.e., there is a 95% certainty that the responses are statistically different). We therefore highlight only those items for which differences between pairs of data groups are *statistically significant* by inserting a "☆" next to the item, as shown in Figure iia. For all charts in this report for which we also report differences, such comparison charts follow the main chart. An example comparison chart in shown in Figure iib.

In the comparison charts themselves, such as Figure iib, we illustrate the significantly different responses by juxtaposing each data group's response. Since there are three comparison groupings, up to three comparison charts may exist for each figure. In the comparison charts, the order of data is indicated by the pair of boxes located at the top right of the chart as well as by the chart label (see Figure iib). In the case shown, Pilot, '99 data appear in the top bar for each item; Program data appear in the bottom bar. We list the number of respondents for each item in the order indicated in the chart label. Looking at Figure iib, we see that the Program cohort rated both *Physics is Phun* and *Mobile Math* as more valuable than did their peers in the Pilot cohort.

Figure iib
Pilot, '99 - Program
Significant Differences for
Value of Software Applications





PROFILE OF RESPONDENTS' SCHOOLS

- In terms of student population, RITTI educators' schools are comparable to national trends.
- RITTI educators teach more Caucasian and fewer African-American students than teachers on average nationwide.
- The schools in which most RITTI teachers work are urban.
- RITTI participants' schools are not more affluent than schools nationwide.

To understand how participants in the Rhode Island Teachers and Technology Initiative (RITTI) are similar to and different from teachers nationwide, we compared this group to national averages collected by the National Center for Education Statistics. In this section all data refer to responses from the Entire cohort.

RITTI participants are somewhat more likely to be teaching in large schools than is true of teachers state- and nationwide. A fifth (21.7%) of all RITTI participants report student populations of over 800 students, compared with 15.6% statewide and 16.5% nationally. Over a third (38%) say they teach in medium-size schools (400-799) and 40.4% in small schools (1-399) (see Figure 1).

When compared to national averages RITTI participants are more likely to be teaching in schools they describe as suburban, and less likely to be teaching in urban settings (see Figure 2).

Given that the participants in the RITTI pilot program were drawn from nearly all of the 327 schools within the state, it is not surprising that the subsample of survey respondents is teaching in schools that reflect student demographics statewide. In general, Rhode Island has a higher percentage of Caucasian students and a lower percentage of African-American students than is true nationwide. The percentage of students receiving free or reduced-price lunch in the RITTI sample is comparable to both the Rhode Island state and national averages (see Figures 3 & 4).

Figure 1
School Size

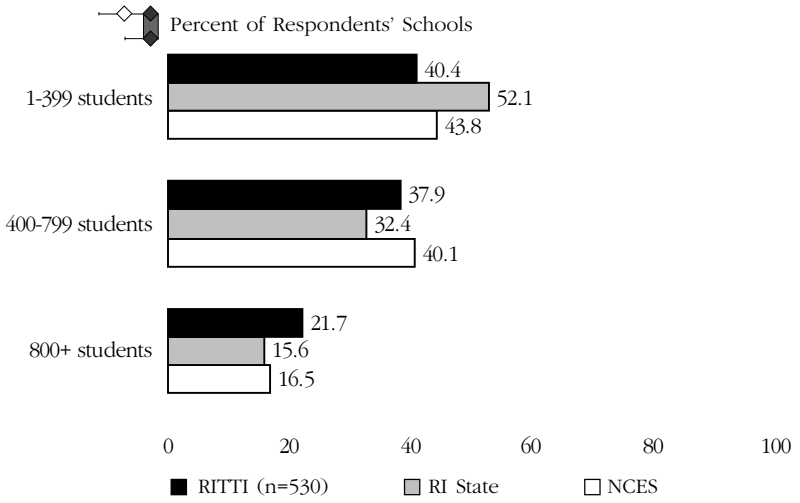
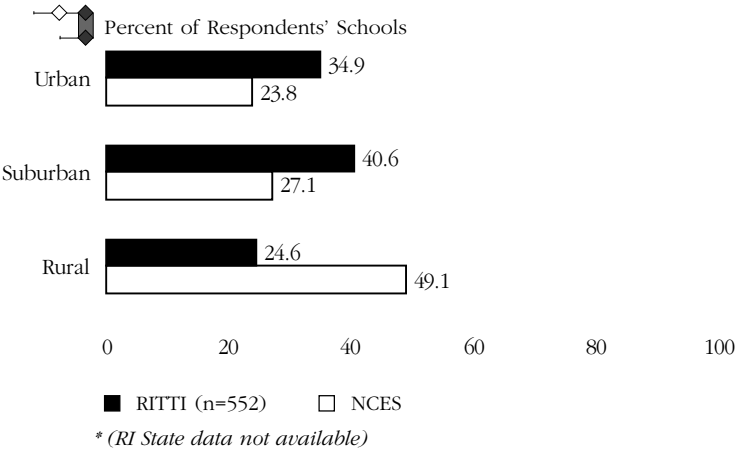
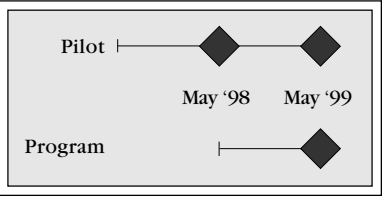


Figure 2
Type of Community*



** (RI State data not available)*



Sources

Figure 1
RITTI question 48; RI State data; NCES (1995), p.104, Table 94.

Figure 2
RITTI question 54; NCES (1993-94), p.22, Table 2.1.

Figure 3
RITTI question 49; NCES (1995), p.60, Table 44.

Figure 4
RITTI question 50; RI State data; NCES (1995), p. 398, Table 365.

Figure 3
Students' Ethnicity

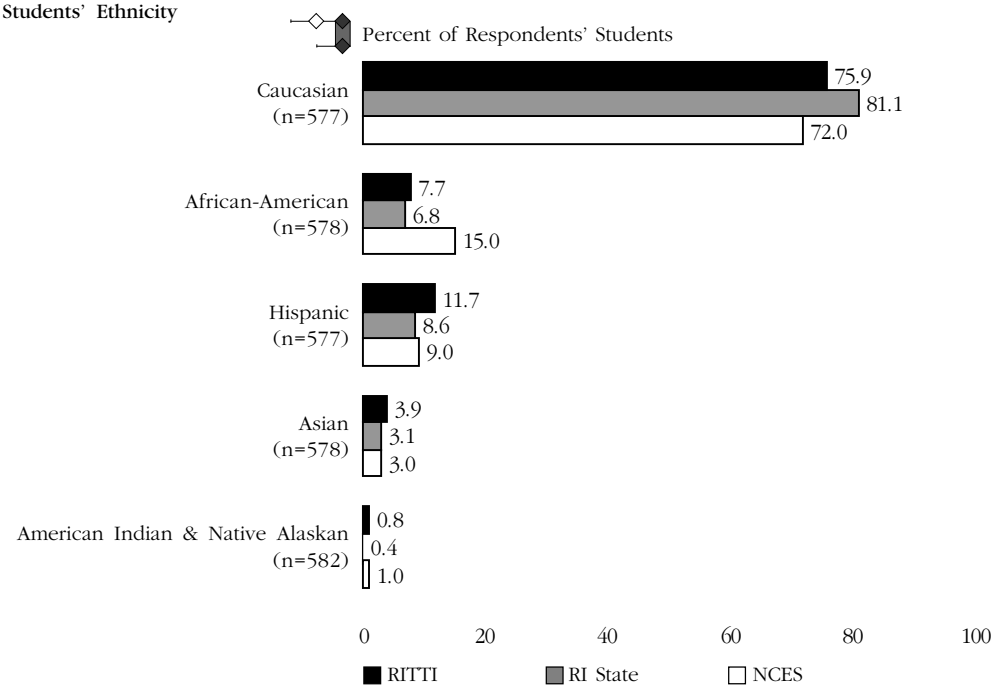
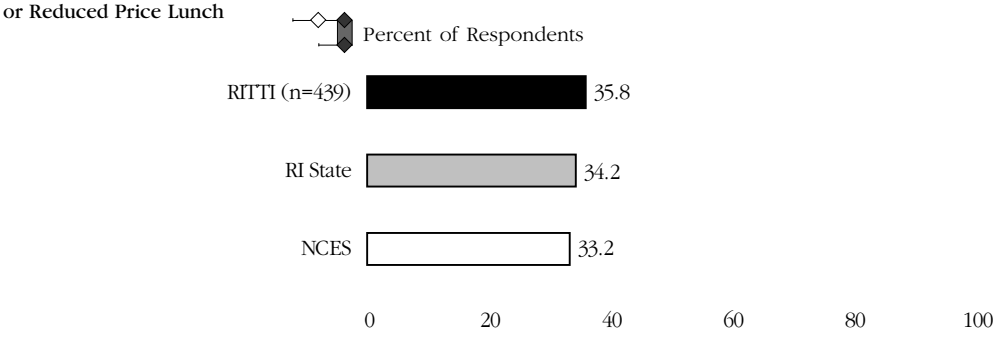


Figure 4
Students Receiving Free or Reduced Price Lunch



Pilot — May '98 — May '99

Program

PROFILE OF RESPONDENTS

- RITTI participants are experienced and highly educated teachers.
- They are significantly older than teachers nationwide, and are almost entirely Caucasian.
- When compared to national demographics, there are many more female teachers participating in RITTI.
- Close to half of the RITTI educators teach at the elementary level; the other half are distributed across middle and high school grades and are teaching in all major subject areas.

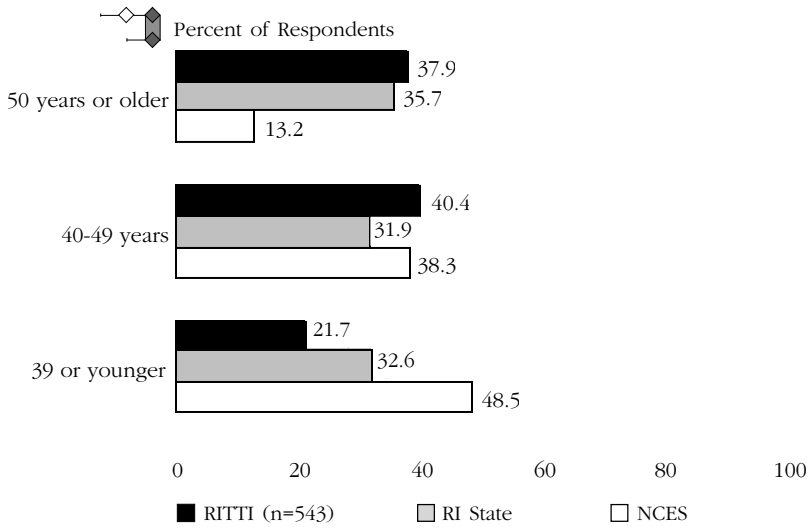
As was true in the Pilot Year Report, RITTI educators from the Entire, '99 cohort tend to be an older, experienced, highly educated, and ethnically homogeneous group. Thirty-eight percent of RITTI participants are aged 50 or older, as compared with only 13.2% nationwide. RITTI educators between the ages of 40 and 49 constitute two-fifths of the sample (see Figure 5).

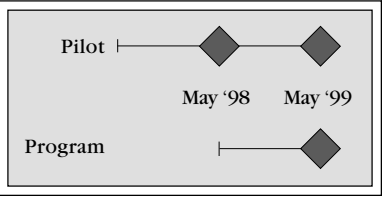
When compared with national averages the RITTI teachers are experienced educators. Almost half (47.5%) have been teaching for over 20 years, slightly higher than teachers nationwide. Over a third of the Entire cohort have between 10 and 20 years' experience teaching; new teachers with less than 10 years' teaching experience make up 16.7% of the Entire cohort (see Figure 6).

RITTI continues to attract teachers who are highly educated. As was true in the Pilot year, the majority (79%) have earned at least a master's degree, compared with 59% of teachers statewide and 47% of teachers nationally (see Figure 7). The RITTI teacher population is overwhelmingly Caucasian (97.1%) (see Figure 8). There are also more female teachers in RITTI (86.5%) than there are state- and nationwide (73%) (see Figure 9).

RITTI teachers work with students spanning the K-12 age groups. These teachers are most likely to teach in self-contained classrooms at the elementary level (44%), at a greater percentage than teachers nationwide (34.1%). English/language arts is the most highly reported content-specific subject taught by respondents (11%). Special education teachers (7.3%), math/computer science educators (6.6%), and science teachers (4.9%) make up the next most reported subjects. Library/media specialists, for which national data are not yet available, follow this group (4.1%). The remaining RITTI participants work primarily in the fields of foreign language, art, performing arts, social studies, and bilingual/ESL instruction. Six percent of respondents report that their primary field of instruction is not described by the categories listed. A few respondents report vocational education or basic/remedial skills instruction as their primary area of instruction (see Figure 10).

Figure 5
Age of Teachers





Sources

Figure 5
RITTI question 65a; RI State data; NCES (1995), p. 77, Table 66.

Figure 6
RITTI question 2; NCES (1995), p.78, Table 67.

Figure 7
RITTI question 5; NCES (1995), p.78, Table 67.

Figure 8
RITTI question 66; RI State data; NCES (1995), p.77, Table 66.

Figure 9
RITTI question 65b; RI State data; NCES (1995), p.77, Table 66.

Figure 10
RITTI question 4; RI State data; NCES (1995).

Figure 6
Years Working as Teachers

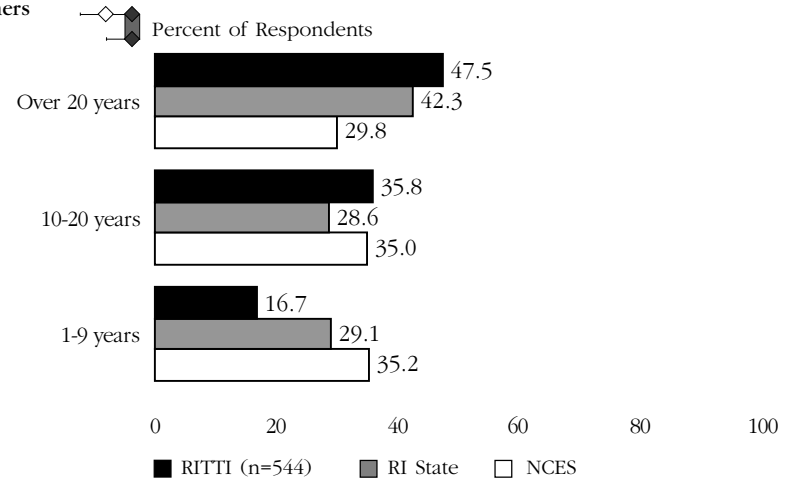
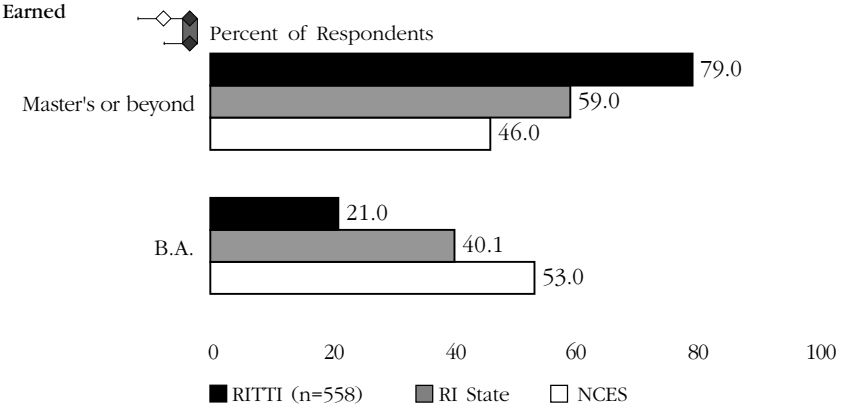


Figure 7
Highest Degree Earned



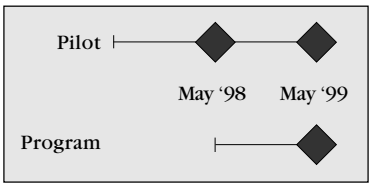


Figure 8
Respondents' Ethnicity

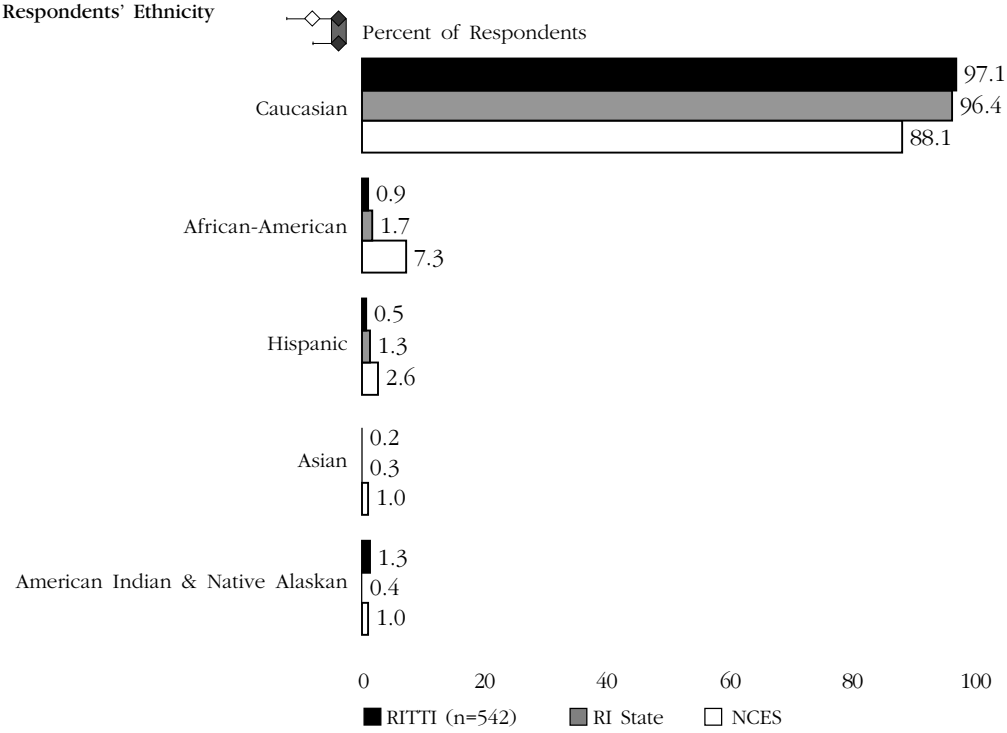
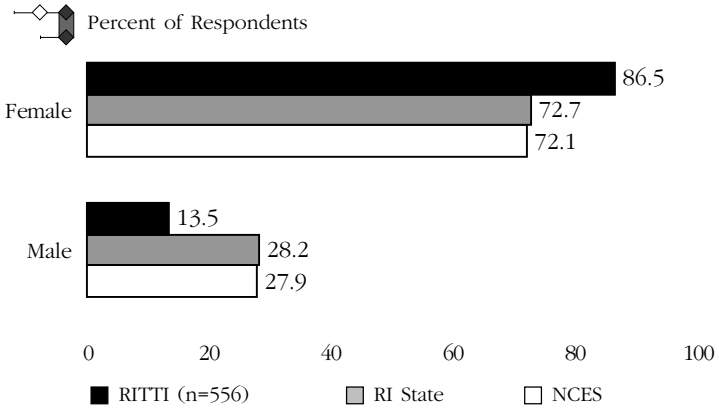


Figure 9
Respondents' Gender



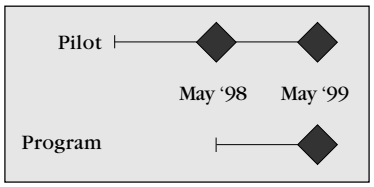
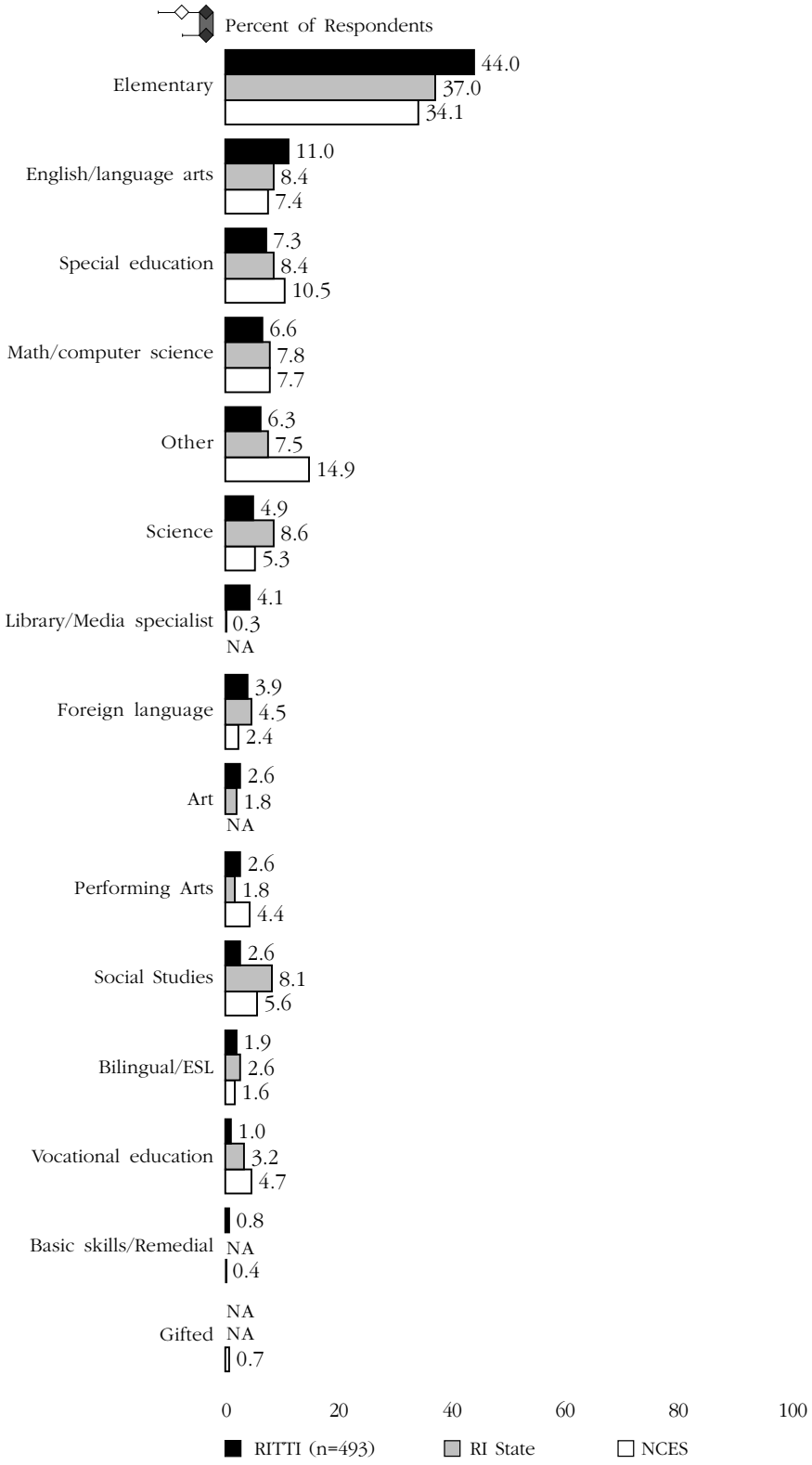


Figure 10
Primary Teaching Assignment



Pilot
May '98
May '99
Program

RESPONDENTS' TECHNOLOGY BACKGROUND AND TRAINING

- Half of the RITTI sample are veteran users of computers with 3 to 10 years' experience.
- Most RITTI educators make use of computers and the Internet with students on a regular basis.
- RITTI teachers have been using stand-alone computer applications longer than telecommunications tools.
- They are investing a substantial amount of personal time in using their laptop computers.
- RITTI educators are highly motivated. The majority are self-taught and are taking advantage of a wide range of formal and informal training opportunities.
- These teachers have made dramatic gains in a variety of technology-related skills since participating in RITTI.

In this section we explore RITTI participants' technology background and training. RITTI educators are making considerable use of computer and Internet access and report substantial growth in their technical expertise since participation in the program.

When queried about their personal experience (i.e., not for direct instruction with students), over half (51.4%) of all RITTI educators report being veteran computer users with three to ten years' experience. Novice users of computers make up over a quarter (26.4%) of all RITTI educators in this respect. With less than one year's experience, new users make up 17.6% of all RITTI teachers. Nearly all RITTI educators (95.4%) now use technology every day. These data suggest that for some RITTI teachers (17.6%), participation in the initiative has been a decisive factor in the integration of technology into their daily routines (see Figure 11a).

To better understand the characteristics of the Pilot and Program cohorts, we also report each group's computer experience after one year of RITTI participation. While the precise numbers vary, the only statistically significant difference in computer experience across these two groups is in the 6- to 10-year range. These data indicate that the Program cohort entered RITTI with slightly more years of computer experience than their peers in the Pilot cohort (see Figure 11b).

Examining RITTI participants' overall use of computers weekly with their students reveals that almost half (40.8%) of these educators are veteran users (3-10 years) of technology for direct instruction. A quarter (24.8%) of respondents report being novice users with 1 to 2 years' experience, and new users (less than 1 year) constitute 18.2% of the sample. A substantial 83% of these educators make use of computers for instruction on a weekly basis. The data indicate that RITTI educators have moved quickly to using computers regularly with their students relative to their personal experience with technology (see Figure 12a).

Comparing each cohort's use of computers with students after one year of RITTI experience indicates that while both groups have statistically equivalent responses for the veteran range of 3 to 10 years, the Pilot group was slightly more likely to be using computers with students than their Program cohort peers. Ninety percent of Pilot teachers had some experience utilizing technology with students compared with 82.4% of Program educators (see Figure 12b).

RITTI participants report fewer years' experience with the use of telecommunications tools for professional or recreational purposes. Over half (59%) of the respondents have been using telecommunications for less than 2 years, nearly a third for 3 to 5 years, and only 8.9% for 6 to 10 years. The difference between the two cohorts is notable, with the Program cohort reporting overall significantly more experience in the 3 to 5 and 6 to 10 year ranges than did members of the Pilot cohort after 1 year of RITTI. This is not surprising given the rapid increase in ubiquity of telecommunications. All but the 1- to 2-year-range differences are significant for this item (see Figures 13a-13b).

RITTI educators are much less likely to be making use of telecommunications with their students than for personal use, with nearly a quarter (22.4%) of all respondents reporting no use of telecommunications with students and nearly two-thirds reporting less than 2 years' experience with telecommunications for instruction. Only 13.9% of RITTI educators are veteran users of this technology with students. As data in the *Barriers to the Use of Technology* and *Technology Infrastructure in Respondents' Schools* indicate, the lack of Internet access in schools is a determining factor in the extent to which RITTI participants use telecommunications with students. Comparing the Pilot and Program cohorts at the end of each sample's first year in RITTI reveals that while responses are not notably different in the various ranges of use, members of the Pilot cohort were more likely than members of the Program cohort to make regular use of telecommunications with their

Sources

Figure 11a
RITTI question 6a.

FIgure 11b
RITTI question 6a; RITTI (1998) question 6a.

Figure 12a
RITTI question 6b.

Figure 12b
RITTI question 6b; RITTI (1998) question 6b.

Figure 13a
RITTI question 6c.

Figure 13b
RITTI question 6c; RITTI (1998) question 6c.

Figure 14a
RITTI question 6d.

Figure 14b
RITTI question 6d; RITTI (1998) question 6d.

Figure 15a
RITTI question 7a.

Figure 15b
RITTI question 7a; RITTI (1998) question 7a.

Figure 15c
RITTI question 7a; RITTI (1998) question 7a.

Figure 15d
RITTI question 7b.

Figure 15e
RITTI question 7b; RITTI (1998) question 7b.

Figure 15f
RITTI question 7b; RITTI (1998) question 7b.

Figure 15g
RITTI question 7a.

Figure 15h
RITTI question 7b.

Figure 16
RITTI question 8
Multiple responses possible.

Figure 17
RITTI question 64.

Figure 18
RITTI question 9; RITTI question 10.

students by the end of one year's participation in RITTI (see Figures 14a-14b). Data on the development of telecommunicatoin infrastructure in RITTI schools indicate that connectivity is improving across the board (see section *Technology Infrastructure in Respondents' Schools*). This suggests that Pilot participants are more highly motivated to use telecommunications with students than are members of the Program cohort.

When looking at the number of hours that RITTI participants spend using their laptops or other computers, it is evident that these educators are investing substantial amounts of their personal and professional time. RITTI teachers spend an average of nearly 13 hours each week using computers. The Program cohort is following in the footsteps of Pilot cohort in making considerable use of computers; at the end of their first year in RITTI well over half of each cohort reported spending at least 10 hours each week (see Figures 15a-15c).

RITTI educators also report high telecommunications usage, averaging nearly one hour per day. Members of the Pilot cohort report an increase in the 5- to 9-hour range (and a corresponding decrease in the 1- to 4-hour range) in their second year of RITTI, indicating they are even more invested in using their laptops after two years of participation in the initiative (see Figures 15d-15f). Within the Entire RITTI group participants are more likely to use computers or the Internet at locations other than school. Well over half (58.7%) report using computers at home or elsewhere outside of school; over two-thirds of respondents' Internet use takes place outside of school (see Figures 15g-15h).

Participants across the Entire cohort report utilizing a range of resources in learning how to use computers and the Internet. Predictably, respondents overwhelmingly (98.2%) note that RITTI training has been instrumental in their acquisition of technology skills. RITTI participants are highly proactive in developing their skill with technology, with 79.1% describing themselves as self-taught. Colleagues have also played an important role in respondents' training experiences (68.8%). Other resources cited are courses offered by the school district (58.9%), conferences attended on their own time (46%), and family members (43.3%). Nearly a quarter of the Entire cohort report that students at their schools (24.7%) and courses at local colleges (24.1%) have contributed to their technology expertise. Undergraduate or graduate training is noted by 14.6% of respondents and instruction from software consultants by 12.6%. Technology training resources utilized by RITTI participants also include courses offered by the state or county, Project SMART training, simulations, RITTI Trainer training, and national teacher-training institutes (see Figure 16).

When asked from whom they sought technical support on a weekly basis during the past 6 months, over a quarter of participants report turning to their colleagues (26.2%), and 16.9% cite making use of the RITTI listserv. Other resources include building-level media specialists (14.7%) and the school librarian (11.4%). Some respondents also note seeking weekly assistance from district-level computer staff, students, and other listservs (see Figure 17).

RITTI participants were asked to rate their ability to use a variety of computer and Internet tools before and after their participation in the summer training. The RITTI summer training has clearly had a tremendous impact on participants' technology skills. Virtually all (99%) RITTI educators now report medium to high ability to send an email message, twice as many as those prior to the RITTI training. Participants' ability to conduct Internet searches has more than doubled, resulting in nearly all of the RITTI cohort (98.2%) reporting a medium to high ability level. Similarly dramatic increases are also reported by these RITTI educators for word processing and other productivity applications as well as for Internet skills such as listserv subscription and webpage construction (see Figure 18).

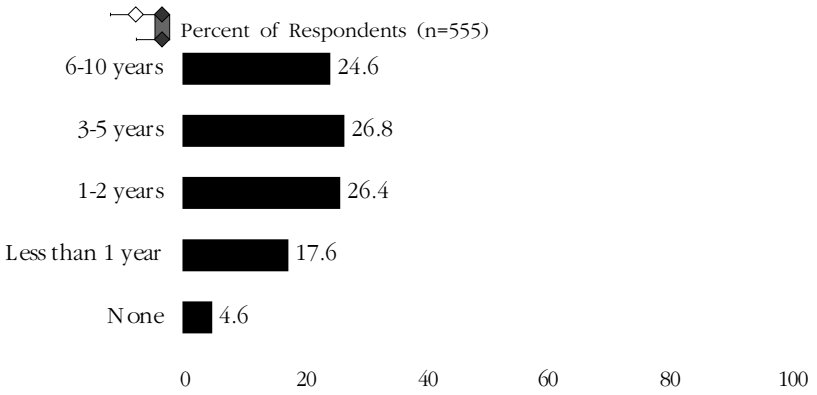
Vignettes

In general, RITTI teachers we observed have advanced quickly from gaining expertise with computers to incorporating the use of computers in their instruction with students. RITTI resources have provided significant support for these teachers throughout the year. RITTI workshops in the fall and spring gave teachers with the opportunity to connect with colleagues around the state, and these professional relationships were strengthened via email and the RITTI listserv. Many teachers mentioned archiving messages from the listserv for future reference.

Before participating in RITTI, Mrs. Lanson was very wary of technology, "knowing nothing about computers and being afraid of technology in general." Mrs. Lanson team-teaches literature in middle school and has now begun to supplement her reading assignments by having students use the Internet to research relevant cultures and authors. She says this was made possible by her experience with RITTI and the ongoing assistance of the school's library/media specialist, who is also a RITTI Trainer. Mrs. Lanson troubleshoots problems as they arise and asks other RITTI teachers at her school for help when needed. One of her goals as a Program Leader for her grade is to use team meetings to show some of the technology work she has implemented with her classes. Her dramatic change in attitude has sparked an interest in the program amongst her colleagues. Even early in the year Mrs. Lanson had already begun to have an impact on other members of her team, who began using the Internet in similar ways after seeing what she achieved with her students. Other teachers on her team have approached her about how to apply to RITTI for the summer 1999 training.

In the comparison charts which appear in this section (Figures 11b, 12b, 13b, 14b, 15b, 15c, 15e, and 15f), items for which differences are statistically significant ($\alpha = .05$) are indicated with a '☆'. Note that for some charts, no significant differences exist.

Figure 11a
Years Using Computers Daily



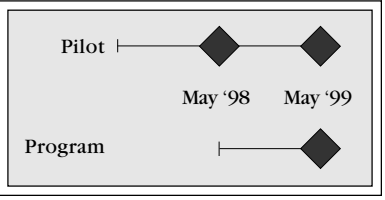


Figure 11b
Program - Pilot, '98
Years Using
Computers Daily

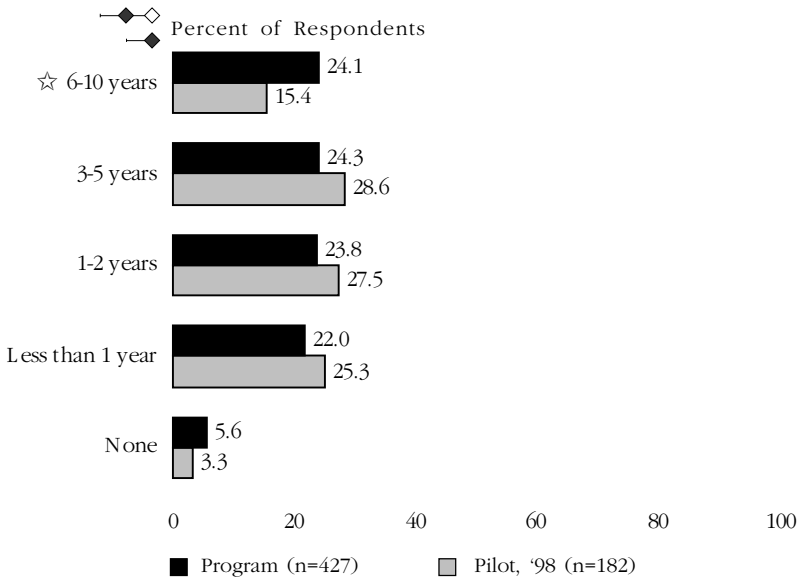


Figure 12a
Years Using Computers
with Students Every Week

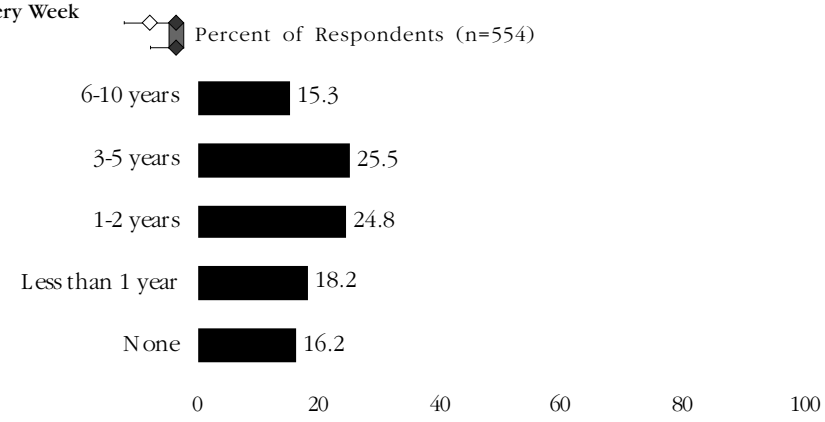
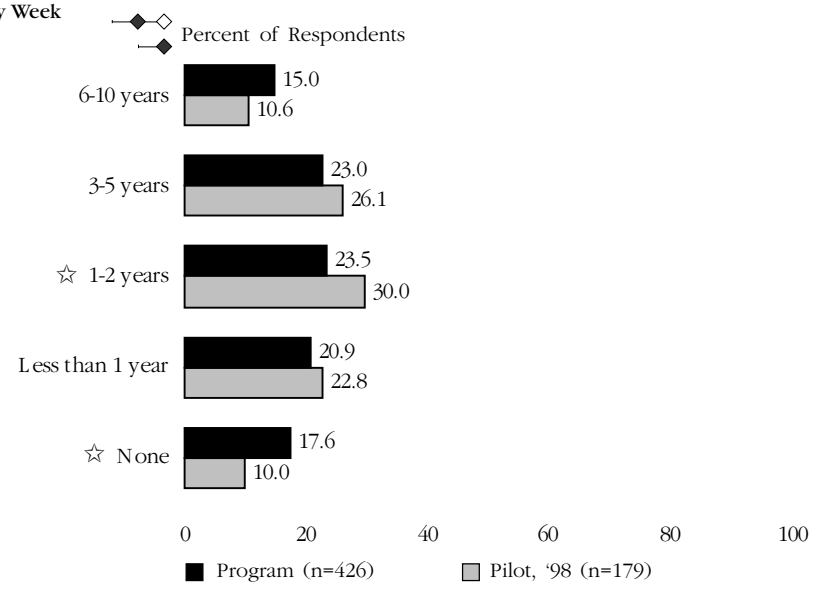


Figure 12b
Program - Pilot, '98
Years Using Computers
with Students Every Week



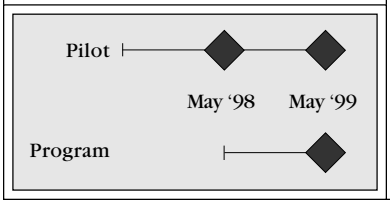


Figure 13a
Years Using Telecommunications for Professional or Recreational Purposes

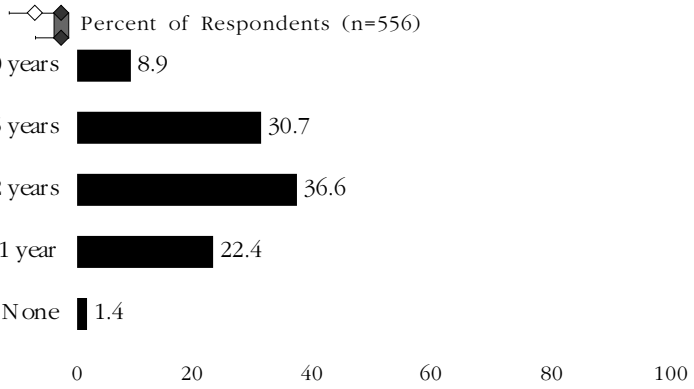
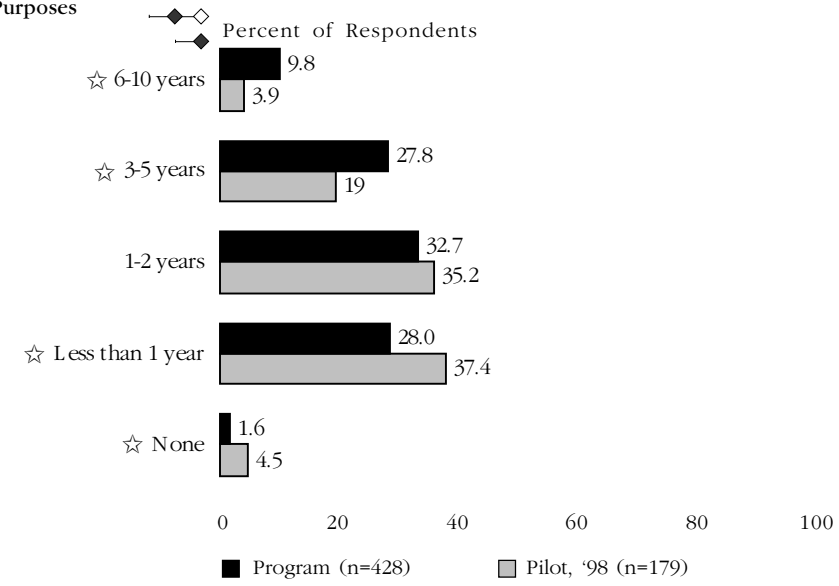


Figure 13b
Program - Pilot, '98
Years Using Telecommunications for Professional or Recreational Purposes



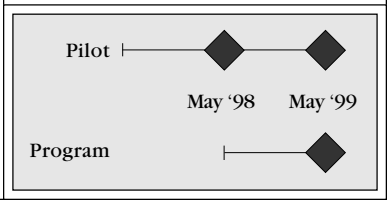


Figure 14a
Years Using Telecommunications with Students

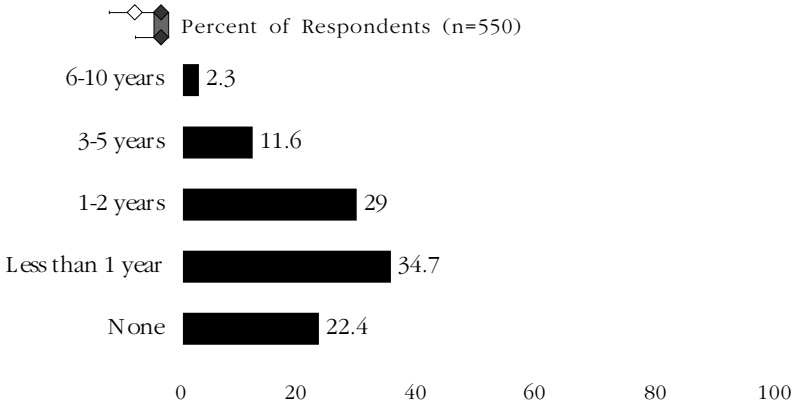
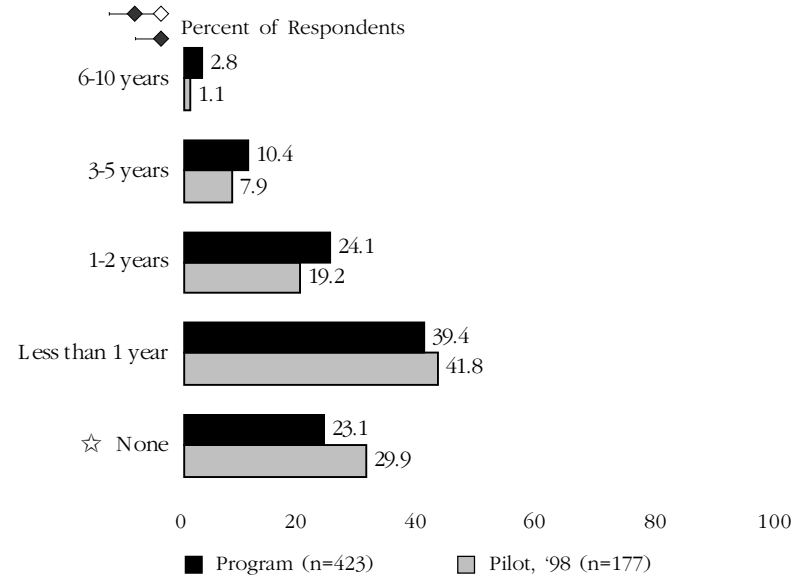


Figure 14b
Program - Pilot, '98
Years Using Telecommunications with Students



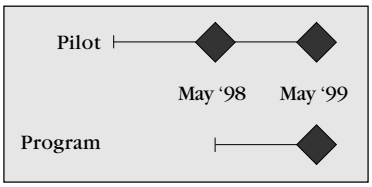


Figure 15a
Total Computer Use per Week

Average Use = 12.9 hrs. per week

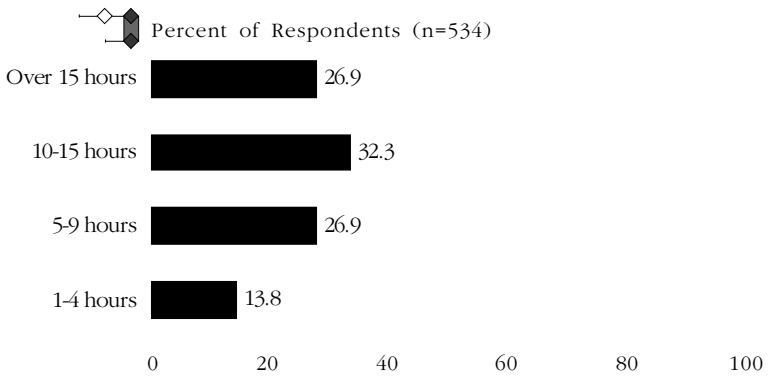


Figure 15b
Program - Pilot, '98
Total Computer Use per Week

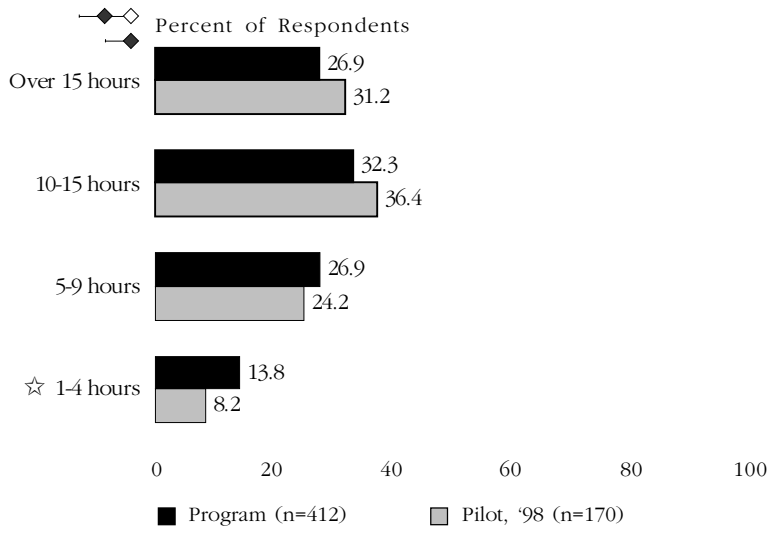
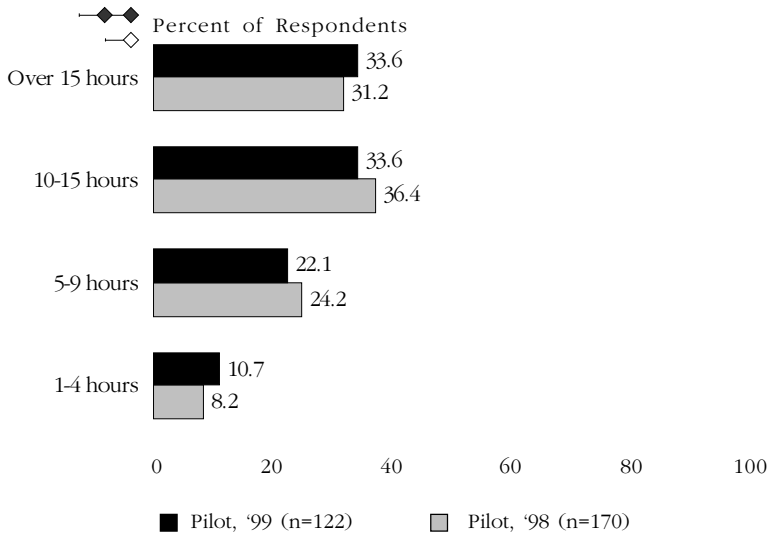


Figure 15c
Pilot, '99 - Pilot, '98
Total Computer Use per Week



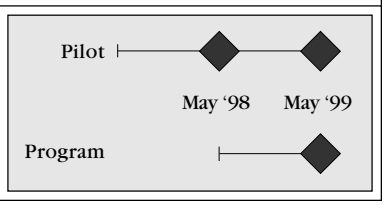


Figure 15d
Total Internet Use per Week

Average Use = 6.8 hrs. per week

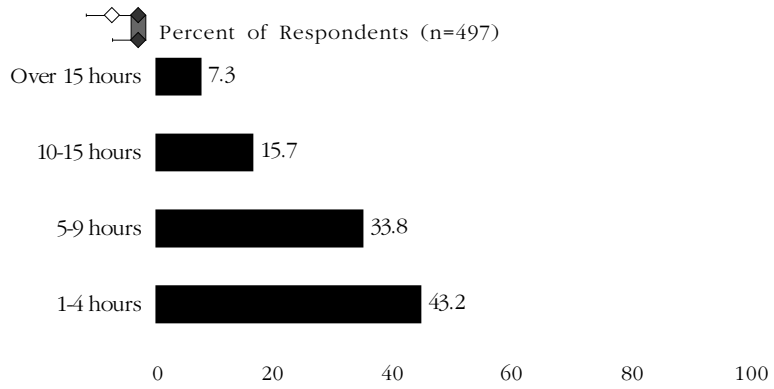


Figure 15e
Program - Pilot, '98
Total Internet Use per Week

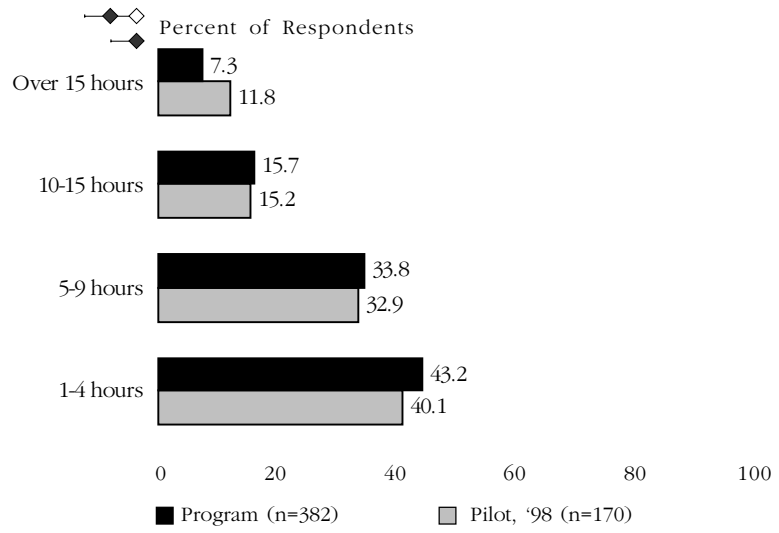


Figure 15f
Pilot, '99 - Pilot, '98
Total Internet Use per Week

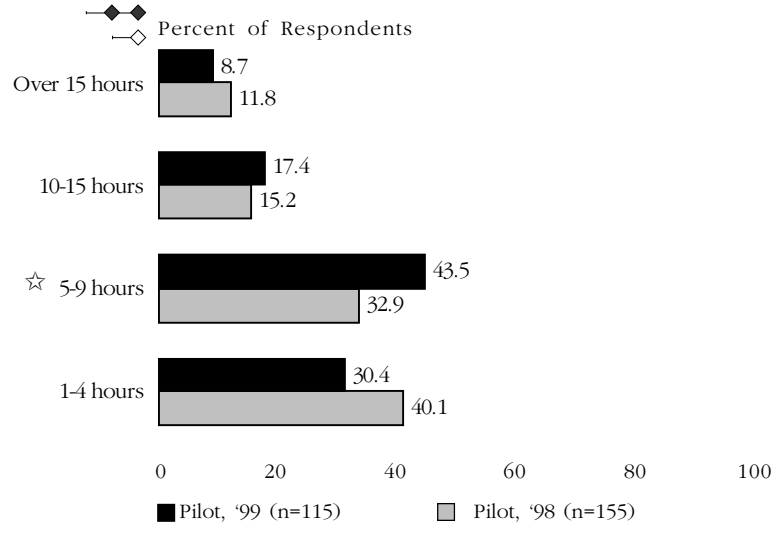


Figure 15g
Total Computer Use
by Location

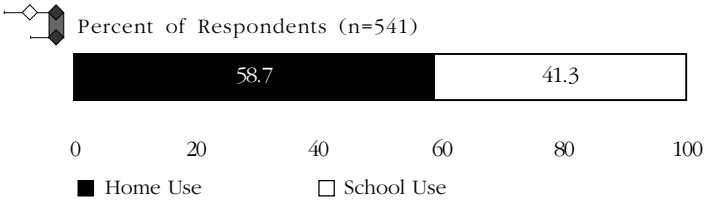


Figure 15h
Total Internet Use
by Location

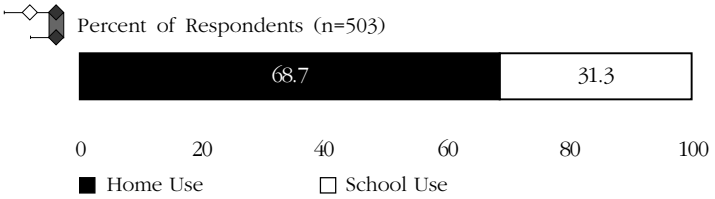


Figure 16
Computer and Internet
Training Experiences

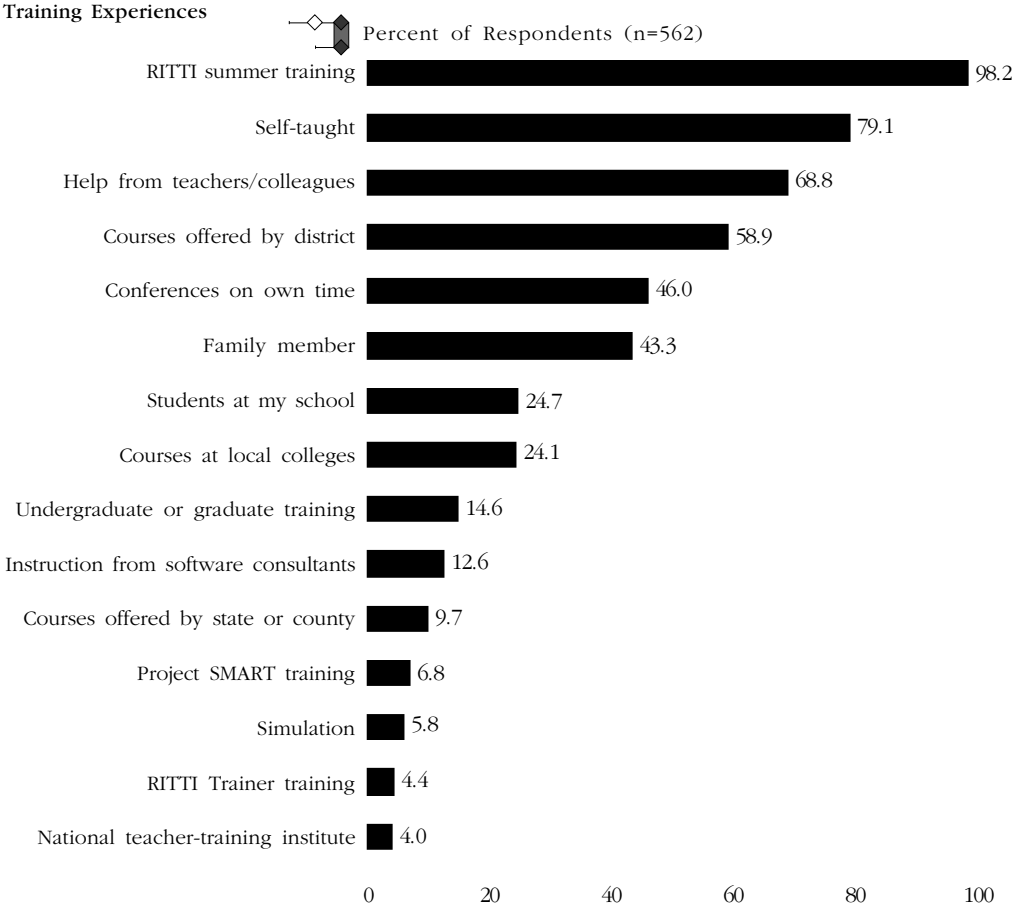


Figure 17
Where Teachers Go for Technical Help

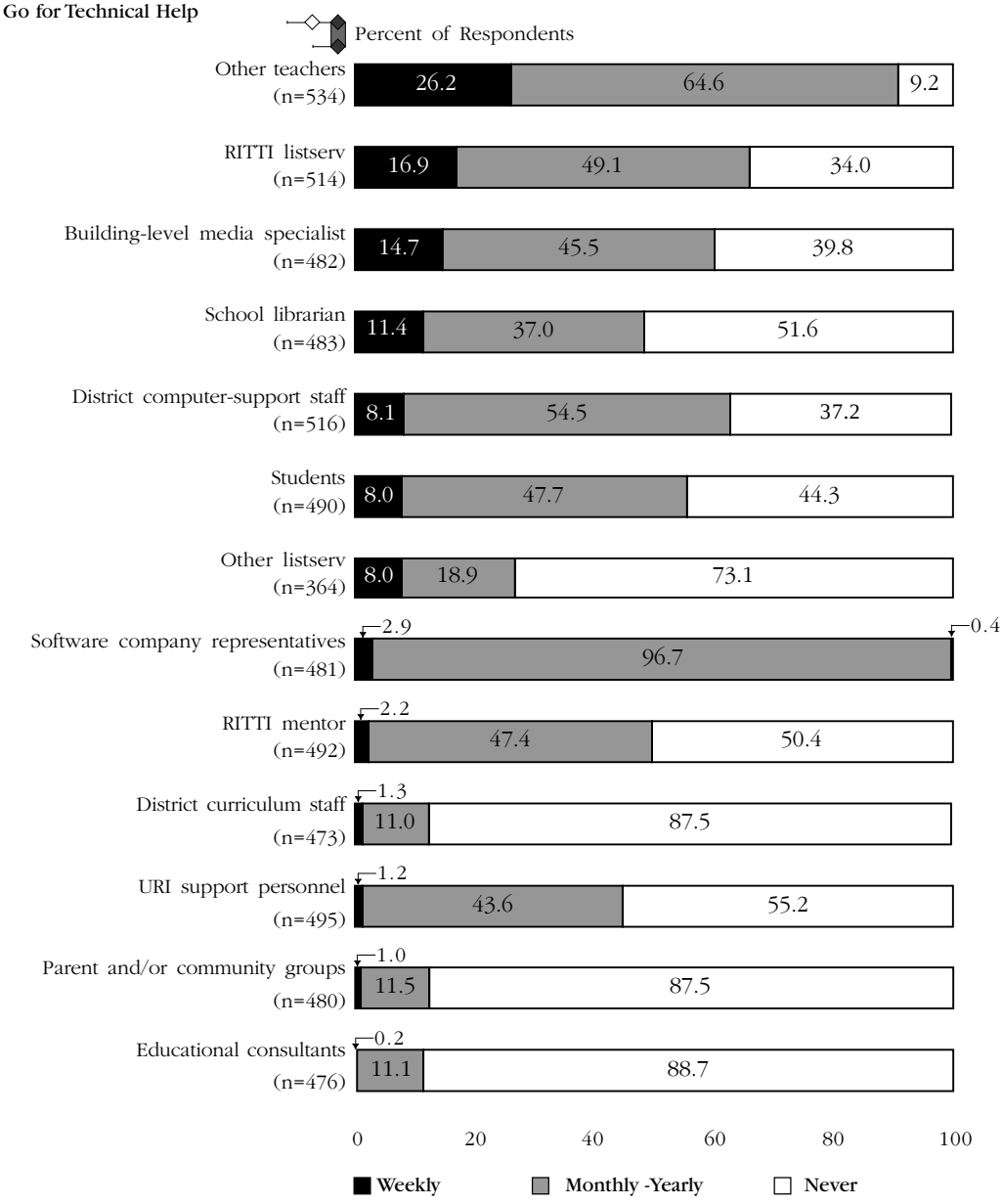
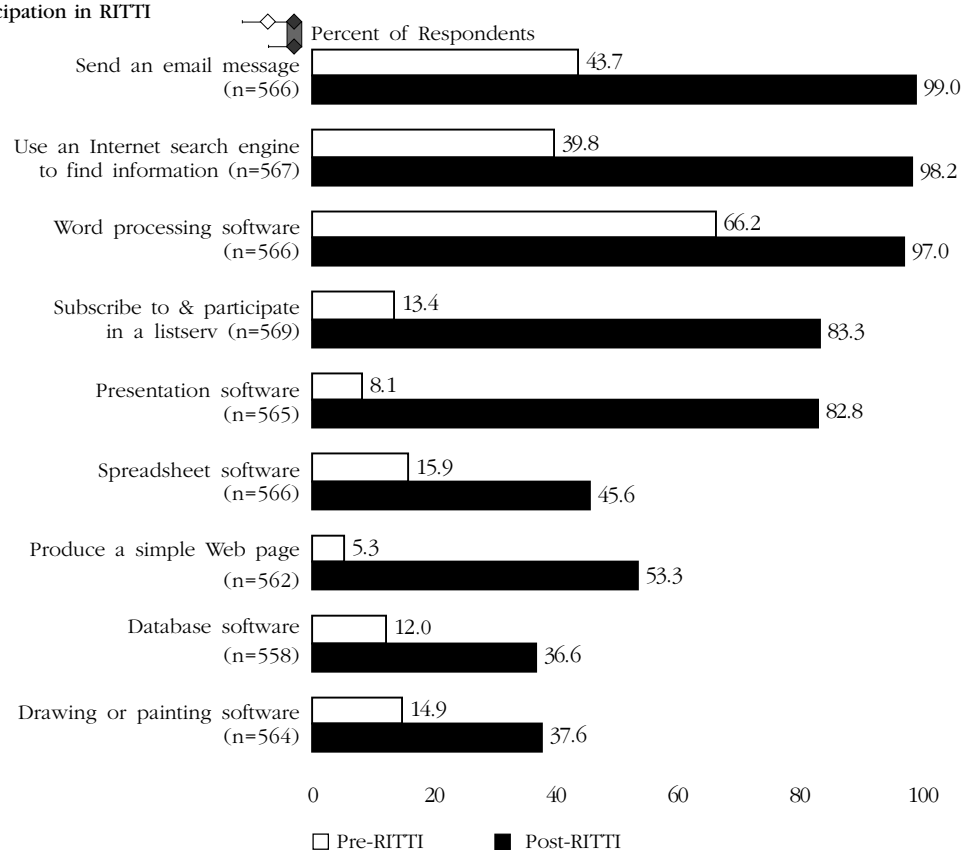


Figure 18
Technical Proficiency Before and After Participation in RITTI



CLASSROOM PRACTICES

- RITTI teachers use the Internet to gather information for instructional purposes, to communicate with colleagues, to plan and prepare lessons, and to communicate with parents.
- RITTI enables teachers to substantially change their professional practices; more Pilot teachers observed more positive changes in their practice than did members of the Program cohort.
- RITTI educators describe computers as essential to their current teaching practices.
- These teachers engage their students in a variety of computer learning activities.
- RITTI participants use the Internet to collaborate with colleagues across the country.
- A growth in technology infrastructure has led to an increase in Pilot teachers' use of the Internet with students.

We queried RITTI participants on a variety of issues around classroom practice to better understand how they are making use of the time they are spending using technology both at home and at school. The data suggest that curricular and professional development activities rather than direct classroom instruction account for RITTI educators' primary use of technology. While schools' technology infrastructures are in a constant state of growth (see the ***Technology Infrastructure in Respondents' Schools*** section of this report), these data suggest that respondents' use of technology with students continues to be constrained by limited access to computers and the Internet in their schools.

RITTI educators' most common (81.9%) use of the Internet is to obtain information for instructional use. The majority (77.9%) of these teachers also report spending at least an hour per week developing their Internet skills. Over half (57.6%) of the respondents cite professional collegiality – emailing colleagues, using the RITTI listserv, attending conferences – as a weekly use of the Internet. Nearly half of all RITTI educators make use of the Internet weekly to request information for their students (46.7%) as well as for other planning and preparation work (46.4%). Communication with parents remains a novelty, however, with only a fifth of the RITTI sample communicating with parents weekly via the Internet (see Figure 19).

When asked to describe their students' use of the Internet, over half of the respondents (55.6%) say they have directed and supervised their students' use of the Internet, while almost one-quarter (22.3%) report that students do not use the Internet for their classes. A small number (12.3%) of RITTI educators' students use the Internet on their own for their classes, and a few (9.8%) report that their students use the Internet under the direction of someone else (see Figure 20a). Examining the Pilot cohort's responses indicates that these teachers are using the Internet more now with their students than after their first year of RITTI (see Figure 20b).

Since participating in RITTI, respondents from the Entire cohort have been more involved in conferences, gained skill in orchestrating multiple activities in the classroom, and spent more time working with other teachers on curriculum and instructional planning. RITTI educators also report substantial changes in their professional outlook, with over half saying they have become more reflective about their practice. These teachers more often find themselves in the role of coach or adviser and report an increase in the extent to which they allow themselves to be taught by students. RITTI teachers note changes in their students as well, observing that students more often offer and seek advice from one another and are taking more initiative outside the classroom than before. Though plagiarism is often highlighted in the popular press as a frequent concern of parents and teachers with respect to use of technology, few RITTI teachers (13.3%) report an increase in plagiarism; in fact, nearly one-fifth report a decrease in this behavior (see Figure 21a).

While substantial increases are reported by each distinct group constituting the Entire RITTI cohort, for a number of items related to classroom practice teachers in the Pilot cohort were more likely to report changes than did their peers in the Program cohort. The Pilot group reports more of an increase in the degree to which they are involved in conferences, spend time working with colleagues on curriculum and planning, and feel the need for longer class periods than do members of the Program cohort. Pilot cohort educators in their second RITTI year are also more likely than Program teachers to observe changes in their students in areas ranging from selecting their own topic for work to letting students decide what resources to use (see Figure 21b).

In examining responses of the three distinct data groupings to these items, a number of differences arise which provide insight into the process of technology integration as well as the practices which characterize each cohort. The Pilot cohort gave similar responses

in both years of the survey in all but three items for this topic. Members of the Pilot cohort report moderate decreases in the degree to which they now allow themselves to be taught by students as well as the extent to which they discuss a subject with students which is fairly new to them. Compared with their observations after one year of RITTI, these educators say they are now somewhat more likely to have students get out of their seats and work actively in the classroom (see Figure 21c).

In terms of classroom practices, the data indicate that after one year of RITTI the Pilot cohort had made more dramatic changes than had members of the Program cohort after their first year in the program. Pilot cohort members were more likely to be involved in conferences, spend time working with other teachers on curriculum or instructional planning, and teach interdisciplinary units. Educators in the Pilot cohort were also more likely to say they had become more reflective about teaching goals, that they have students work on long projects, and that they allow themselves to be taught by students (see Figure 21d). From these differences it appears that Pilot educators overall are more likely to innovate and take initiative on new projects than their peers from the Program group.

Educators within the complete RITTI cohort make use of technology in a variety of ways with their students. Over a third of respondents report that students use computers for assignments on most days; all but 5.4% of respondents' students make some use of technology in this way. Close to two-thirds of RITTI educators report that on some to most days their students are utilizing computers to complete small-group assignments. Well over half the RITTI sample report their students are making use of computers for their own independent work, and close to a third of RITTI educators enhance instruction with the use of overhead and LCD projections with whole classes (see Figure 22). RITTI teachers from each group report equivalently frequent use of the technology with their students in these ways; no significant differences across any pair of data groupings were reported for this survey item.

RITTI teachers in the Entire cohort have their students participate in a variety of technology-related activities during the year, though rarely on a daily or weekly basis. Over three-fourths of respondents report that on at least a monthly basis their students look at sites on the World Wide Web and search for specific information online. Approximately half of these educators engage their students in the use of content-specific applications or presentation tools during the year. A third of their students participate in ongoing email exchanges with individual students, and close to a third report that their students participate in collaborative math or science investigations using technology (see Figure 23a).

With respect to the "never" response on these items, RITTI participants across all three distinct groups report similar frequencies of computer learning activities. A disaggregate of the Entire cohort indicates that Pilot participants' students more often participate in ongoing email exchanges with individual students and whole classes, as well as in collaborative writing projects with classes in other schools (see Figure 23b).

According to the responses of the Pilot cohort for each year of RITTI participation, these educators are now more frequently using the Internet with their students to view websites or search for specific information. The same increases are true for the Program cohort compared with the first-year responses of the Pilot participants. After one year of RITTI, Pilot educators' students more frequently participated in ongoing email exchanges with individual students and whole classes than did their Program cohort peers (see Figures 23c-23d).

RITTI educators consider computers essential to their teaching. Within the RITTI cohort, over three-fourths of the Program cohort and over four-fifths of Pilot teachers rate the

Sources

Figure 19
RITTI question 15.

Figure 20a
RITTI question 16.

Figure 20b
RITTI question 16; RITTI (1998) question 15.

Figure 21a
RITTI question 17.

Figure 21b
RITTI question 17.

Figure 21c
RITTI question 17; RITTI (1998) question 16.

Figure 21d
RITTI question 17; RITTI (1998) question 16.

Figure 22
RITTI question 18.

Figure 23a
RITTI question 19.

Figure 23b
RITTI question 19.

Figure 23c
RITTI question 19; RITTI (1998) question 18.

Figure 23d
RITTI question 19; RITTI (1998) question 18.

Figure 24a
RITTI question 22.

Figure 24b
RITTI question 22; RITTI (1998) question 21.

Figure 25a
RITTI question 23.

Figure 25b
RITTI question 23; RITTI (1998) question 22.

Table 1
RITTI question 24; RITTI (1998) question 23.

use of computers as moderately to extremely essential to teaching. RITTI participants from the Pilot year are more likely to see computers as essential to teaching than are members of the Program cohort (see Figure 24).

Multiple factors motivate RITTI educators' use of technology as an instructional resource, from preparing students for life in an increasingly technological society, to providing opportunities for students who do not have computers at home, to increasing student motivation and participation in their own learning. These teachers also cite keeping up with new technologies, finding out about new teaching practices, and reducing professional isolation as reasons to use computers and the Internet. Other important incentives motivating RITTI educators are the capacity of technology to provide access to materials not available in textbooks, to help students feel more a part of the global community, and to give students the skills they will need in college. Pilot year participants are now less likely to cite the potential of technology as a catalyst to support larger school-change efforts than they were after one year of RITTI (see Figures 25a-25b).

When asked to rank six reasons to use the Internet as an educational resource, respondents within the Entire cohort most highly ranked enabling teachers to actively collaborate with other teachers nationwide and enabling students to communicate with other students around the world. This reflects a change in comparison with Pilot, '98 data, for which providing access to curriculum-relevant information and providing opportunities for gathering resources that enable teachers to build their own curriculum units received the highest rankings (see Table 1).

Vignettes

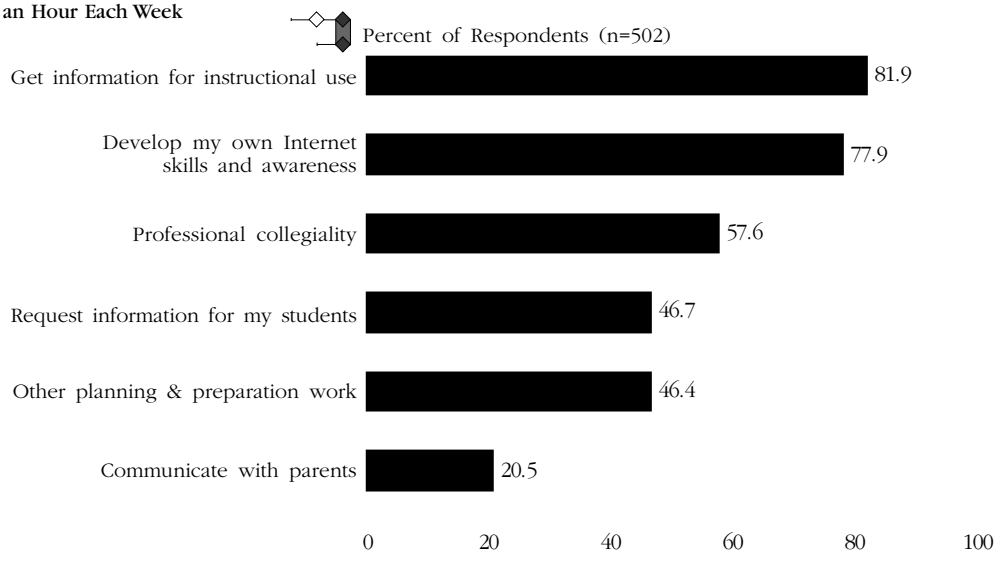
Many teachers have pursued technology-based projects tosupport content-specific learning objectives. One of these is fourth-grade teacher Mrs. Marino, who developed a website for students to use over the course of the year in the science classes. She wanted her students to go online safely, that is, where she knew what they would be seeing. The website she developed has links to a variety of other science sites that relate to the fourth-grade science curriculum. She has created worksheets keyed to the sites so that students have a clear direction when exploring the resources.

At one elementary school, in which nearly all teachers participated in RITTI as a team, the principal observes that technology is showing up in teachers' lesson plans and becoming part of what they do every day. Several teachers explained to us that the Internet has become a daily part of classroom instruction, both spontaneously as well as planned. Students are increasingly accustomed to searching for specific information on the Internet in the context of a class. Teachers we spoke with are also making use of technology features such as animations to help teach certain concepts. One teacher's students have maintained email correspondence with a student's uncle who was on an expedition in the South Pole. This teacher commented that he now expects the technology to be there, "like a dictionary." Even the physical education teacher has made technology use a common part of her students' school day by using the computer in the gym to track students' fitness scores and to show related Internet sites to her students; with her RITTI laptop and gym computer she now writes up all student assignments, including Internet fact-finding searches for students. She has been accepted as a RITTI Trainer for the summer 1999 session.

Several other teachers at this school are also taking steps to increase their use of technology. One first-grade teacher has begun using the Internet to do group research with her students. Through the course of the year she developed more ideas about ways to incorporate the technology with her students. Noting the strong connection between reading and writing, this teacher hopes to have her students do more writing on the computer, with each student saving his or her writing to personal folders. Her hopes for next steps include the development of computer units that relate to the curriculum as well as an increase in the first-grade teachers' working together around the use of technology.

For Mrs. Carte and Mrs. Simone, two RITTI teachers at an urban high school, technology has been key to the success of their team-taught biotechnology class. These educators use the Internet to gather up-to-date information for use with their students, which is not available in textbooks. Biology teacher Mrs. Carte created a web-based timeline to accompany the course; her goal is to work with her students to keep the timeline current and to make it available for others to use. She explained that she would not have attempted this project if she had not participated in RITTI. This summer Mrs. Carte is participating in a trip to Balize for science teachers which she learned about from a colleague on the RITTI listserv. Mrs. Simone, chemistry teacher and 1998 RITTI participant, developed a PowerPoint project for her chemistry students to use in conjunction with heavy metals. Her students are writing a report, creating a pamphlet, and then producing a PowerPoint presentation on the material. She is making use of the resources acquired through RITTI to help her students, about half of whom she estimates have a computer at home.

Figure 19
Uses of Internet for which Respondents Spend at Least an Hour Each Week



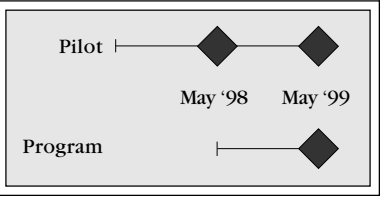


Figure 20a
How Internet Is Used with Students

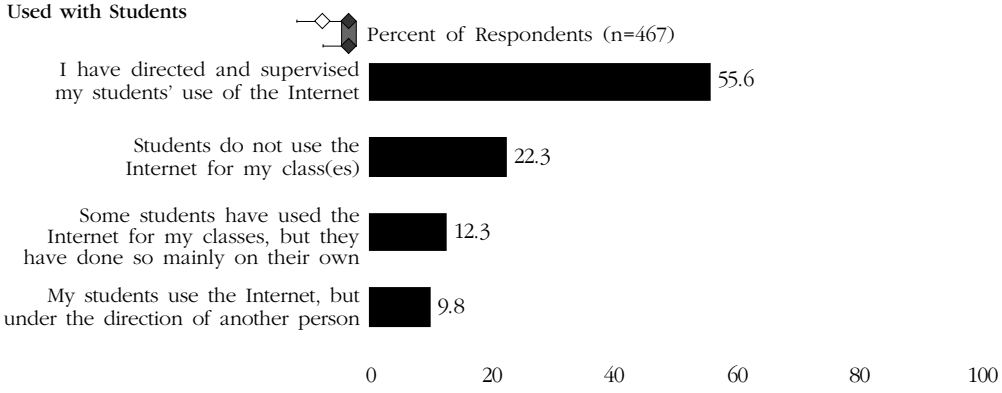
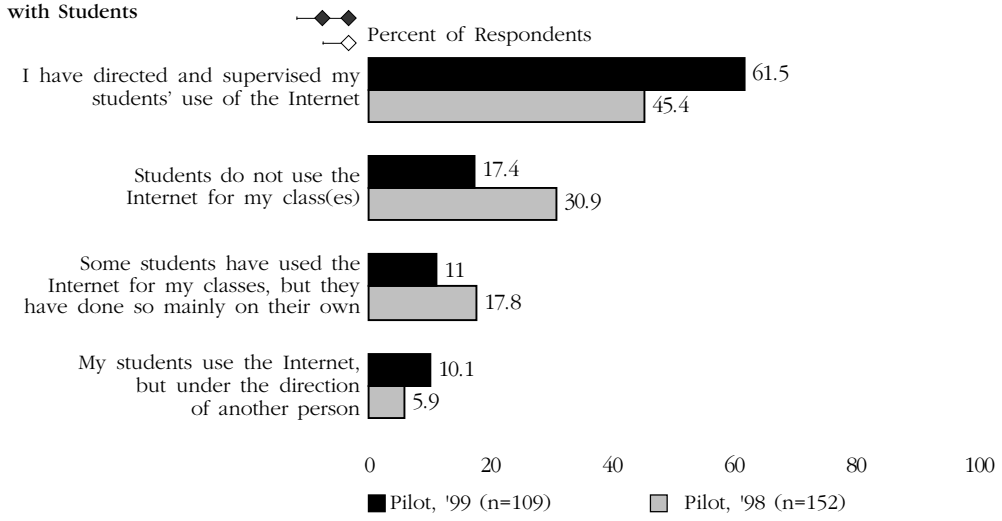


Figure 20b
Pilot, '99 - Pilot, '98
How Internet Is Used with Students



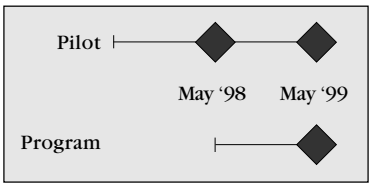


Figure 21a
Respondents' Changes
Observed in Classroom Practices

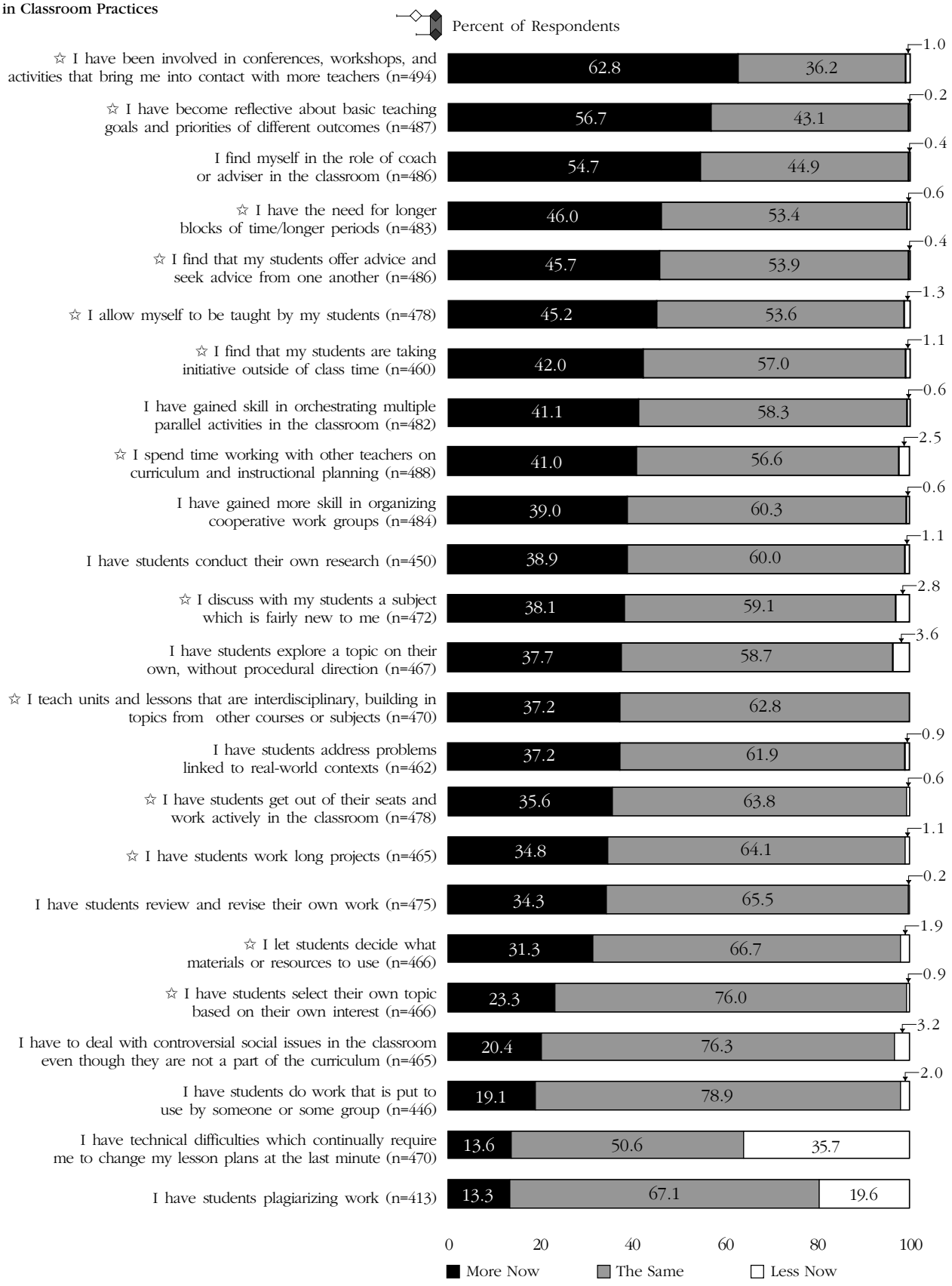


Figure 21b
Pilot, '99 - Program
Changes Observed in
Classroom Practices

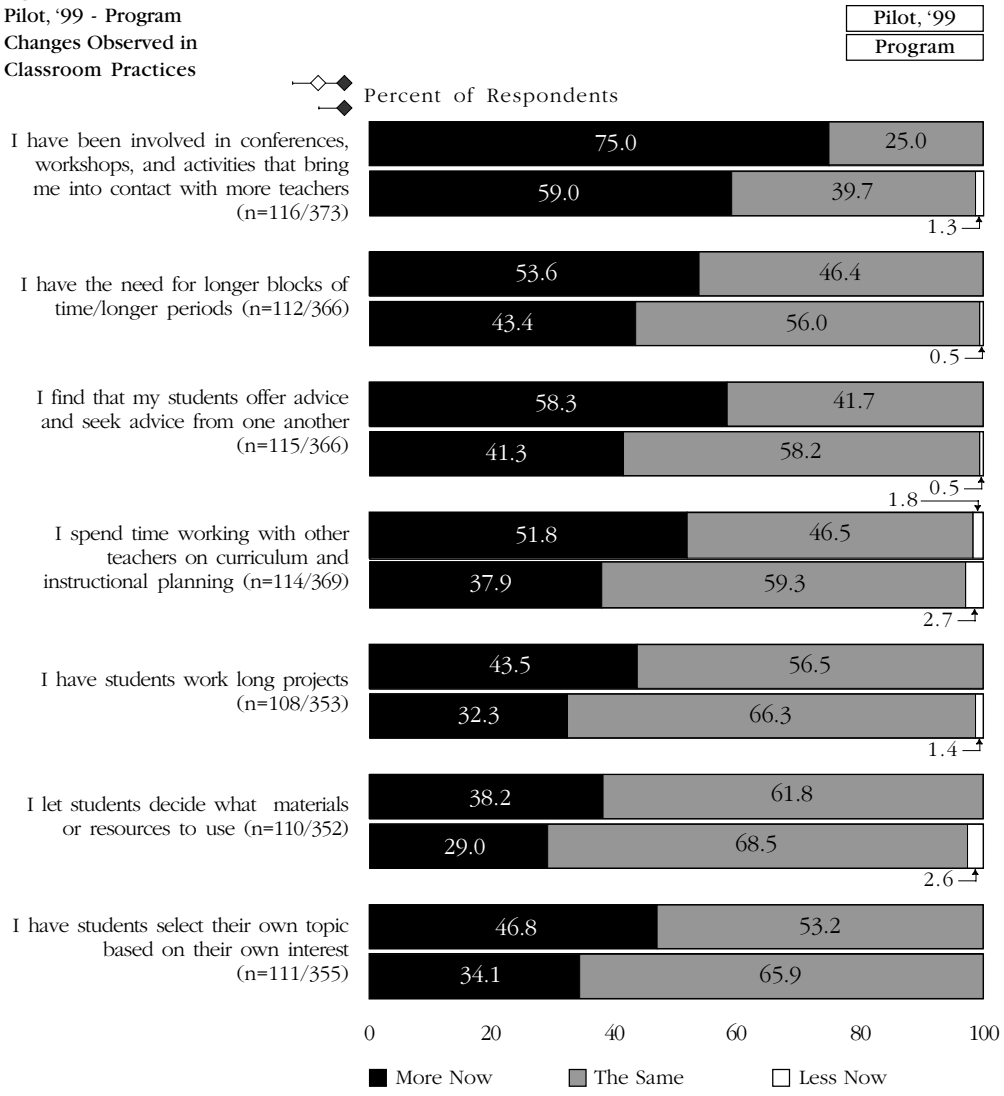
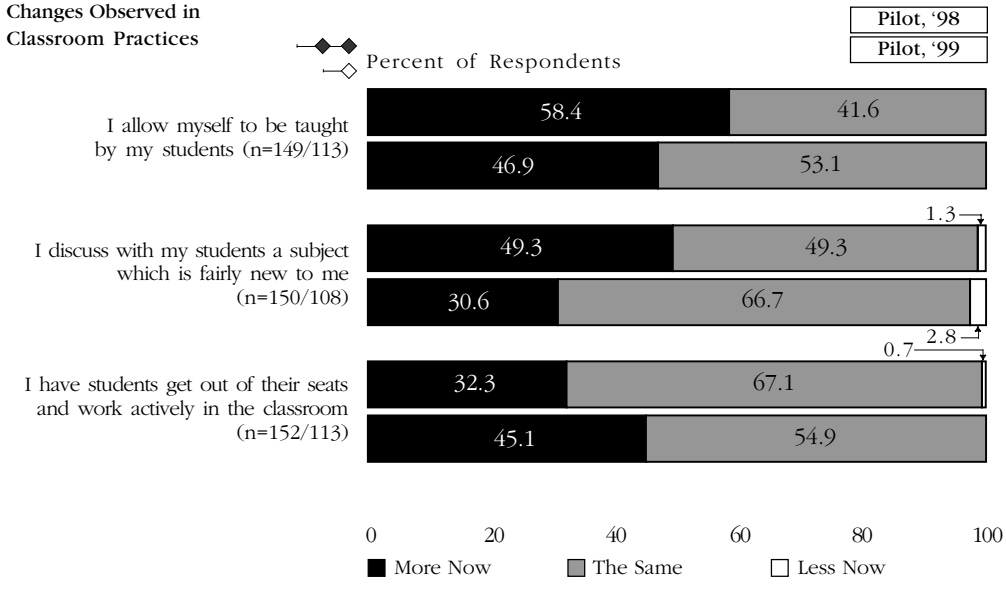


Figure 21c
Pilot, '98 - Pilot, '99
Changes Observed in
Classroom Practices



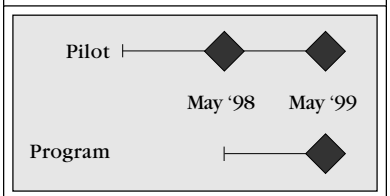
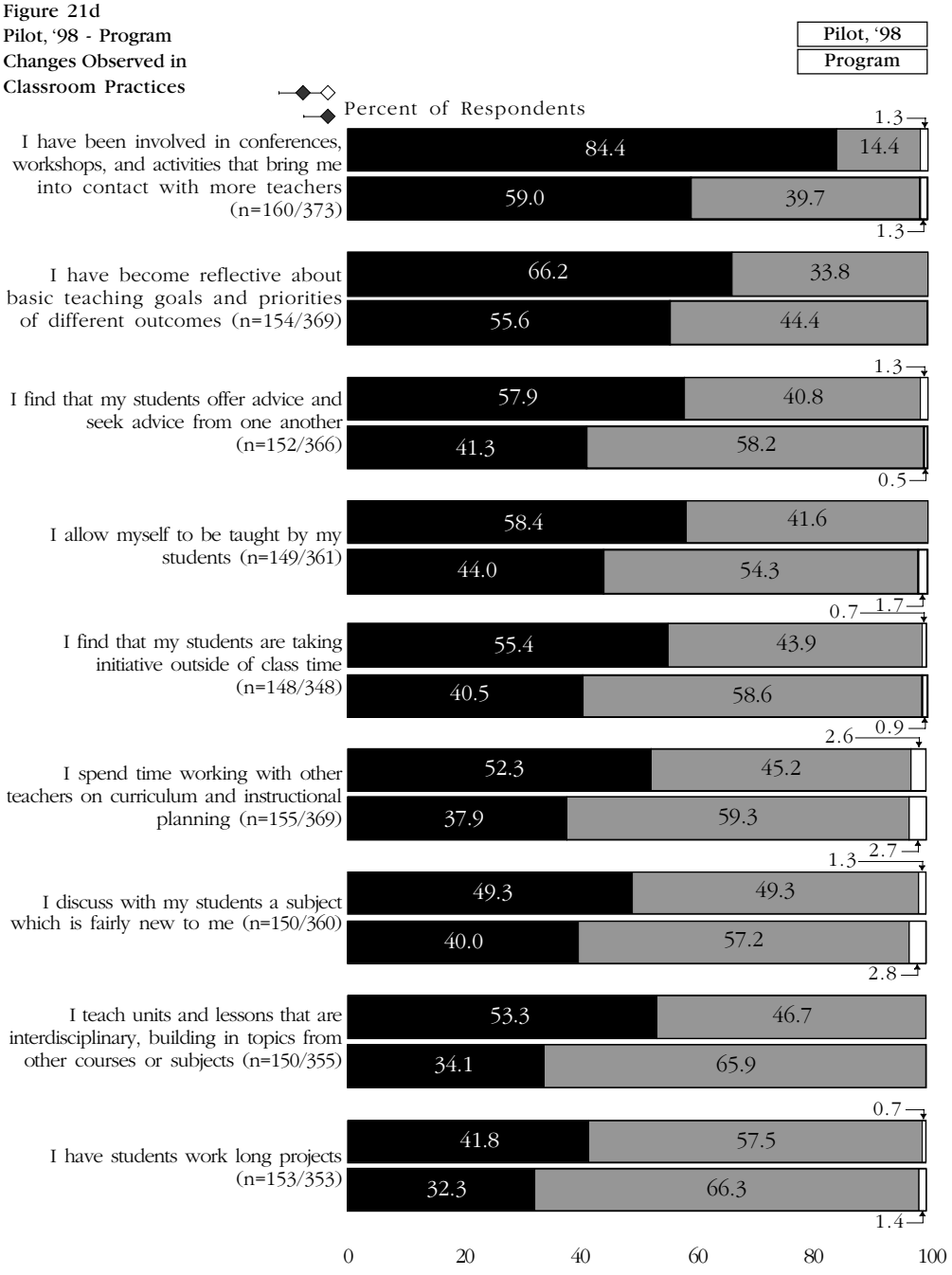


Figure 21d
Pilot, '98 - Program Changes Observed in Classroom Practices



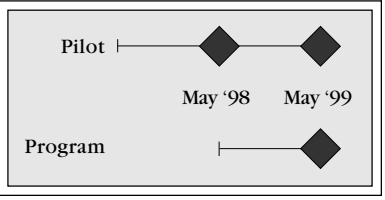


Figure 22
Frequency of Internet Use by Instructional Strategy

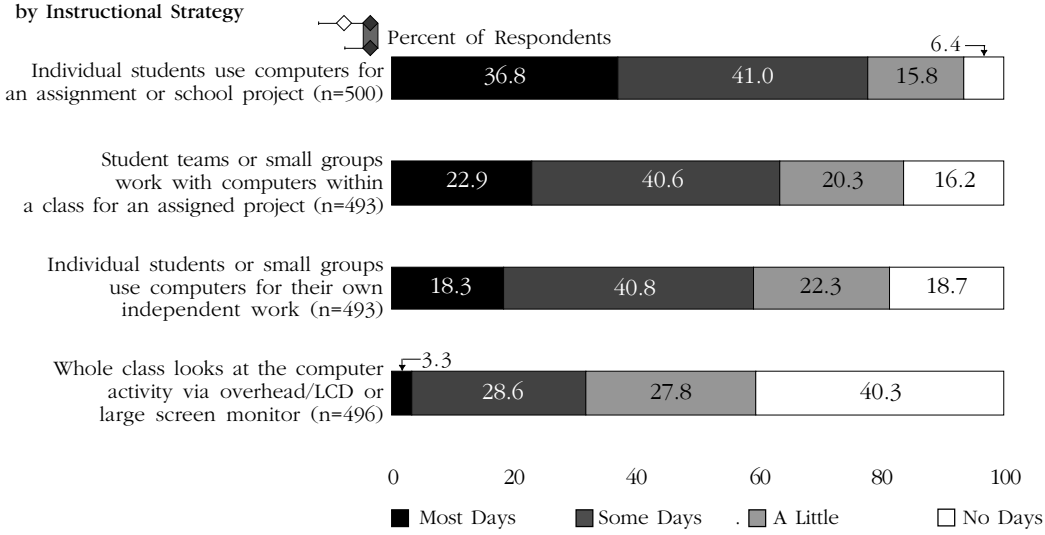
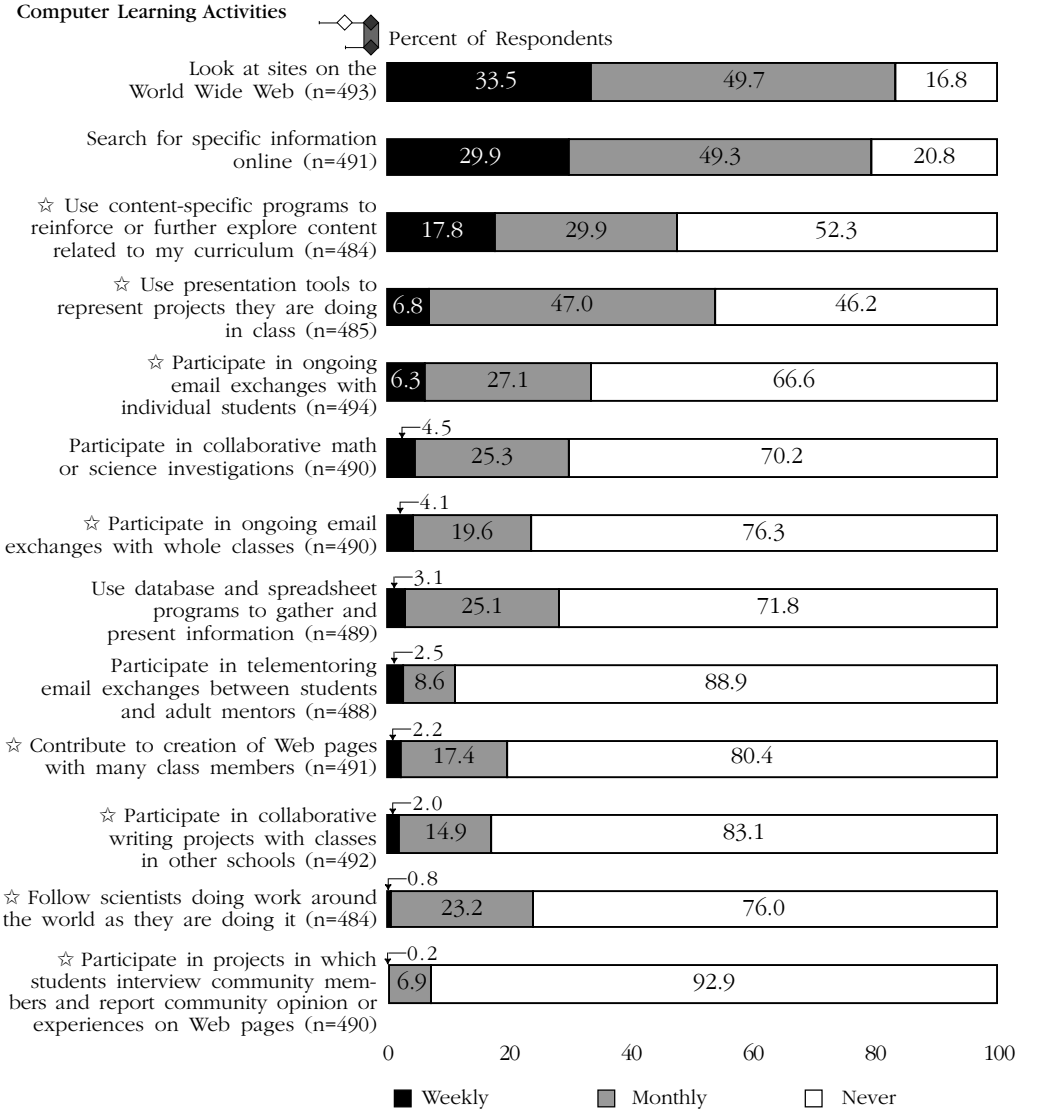


Figure 23a
Students' Participation in Computer Learning Activities



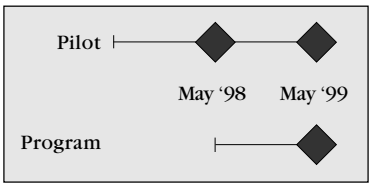


Figure 23b
Pilot, '99 - Program
Students' Participation in
Computer Learning Activities

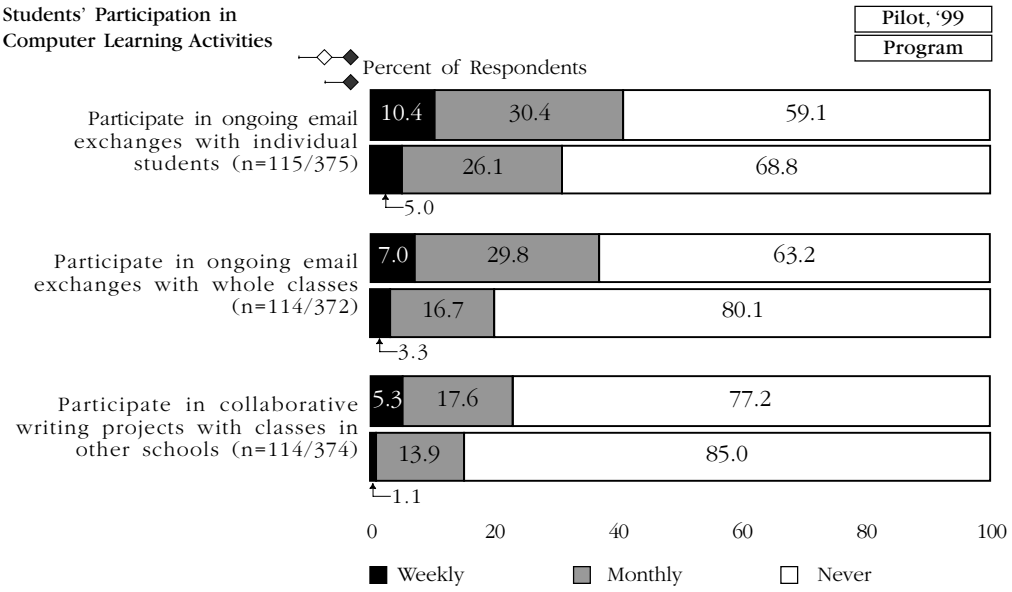
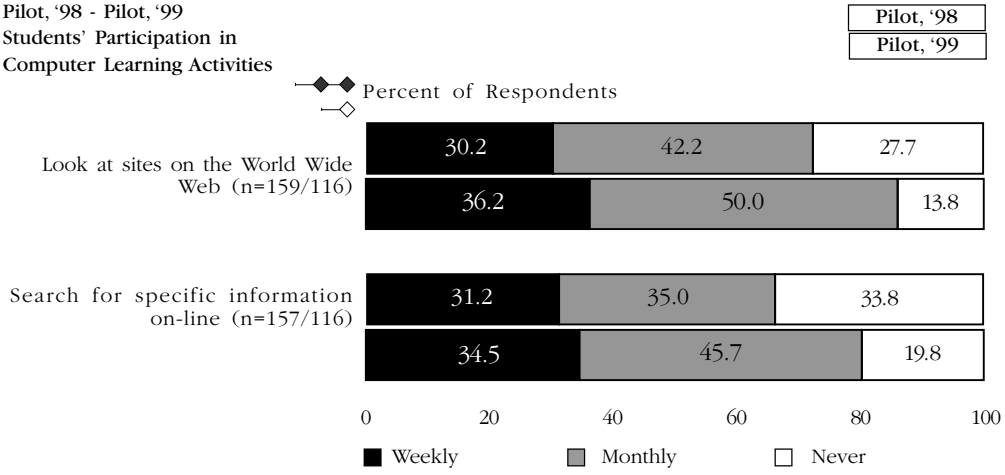


Figure 23c
Pilot, '98 - Pilot, '99
Students' Participation in
Computer Learning Activities



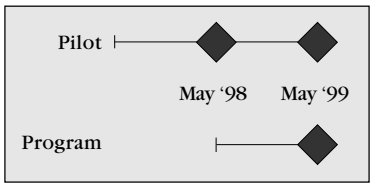


Figure 23d
Pilot, '98 - Program
Students' Participation in
Computer Learning Activities

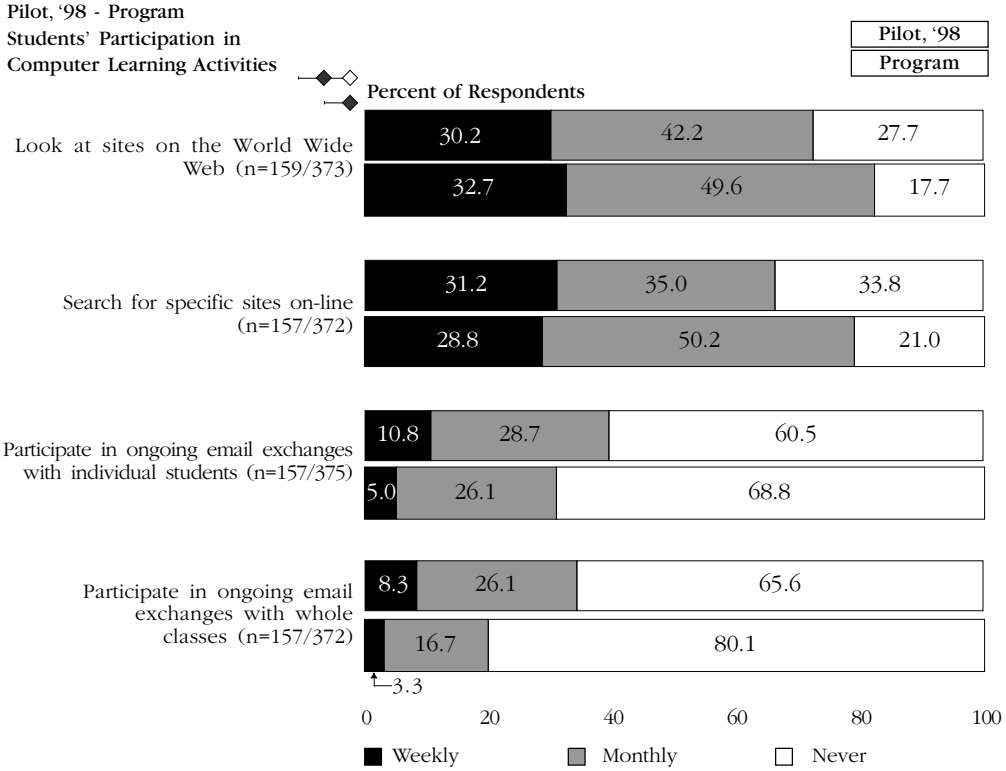


Figure 24a
How Essential Computers
Are to Teaching

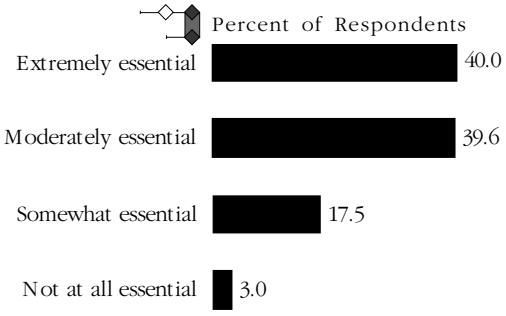
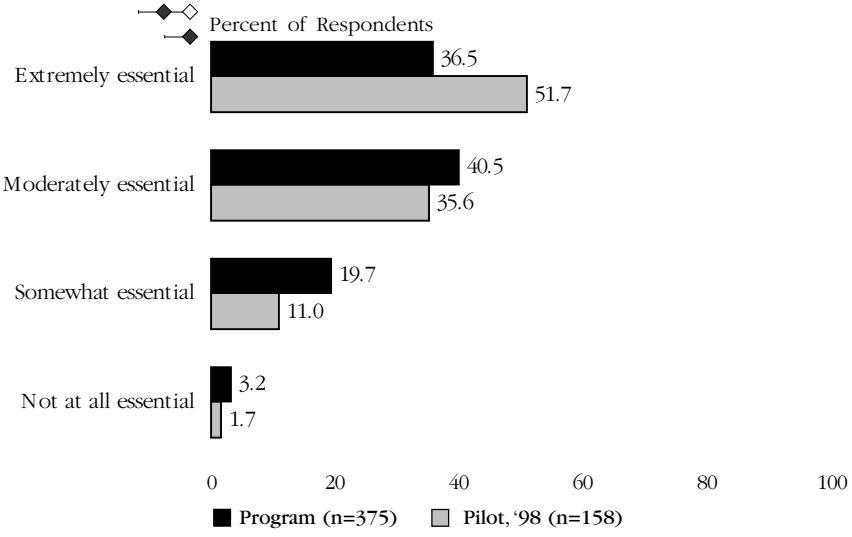


Figure 24b
Program - Pilot, '98
How Essential Computers
Are to Teaching



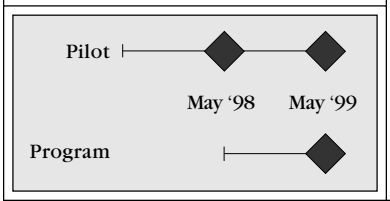


Figure 25a
Why Teachers Use Computers and the Internet with Students

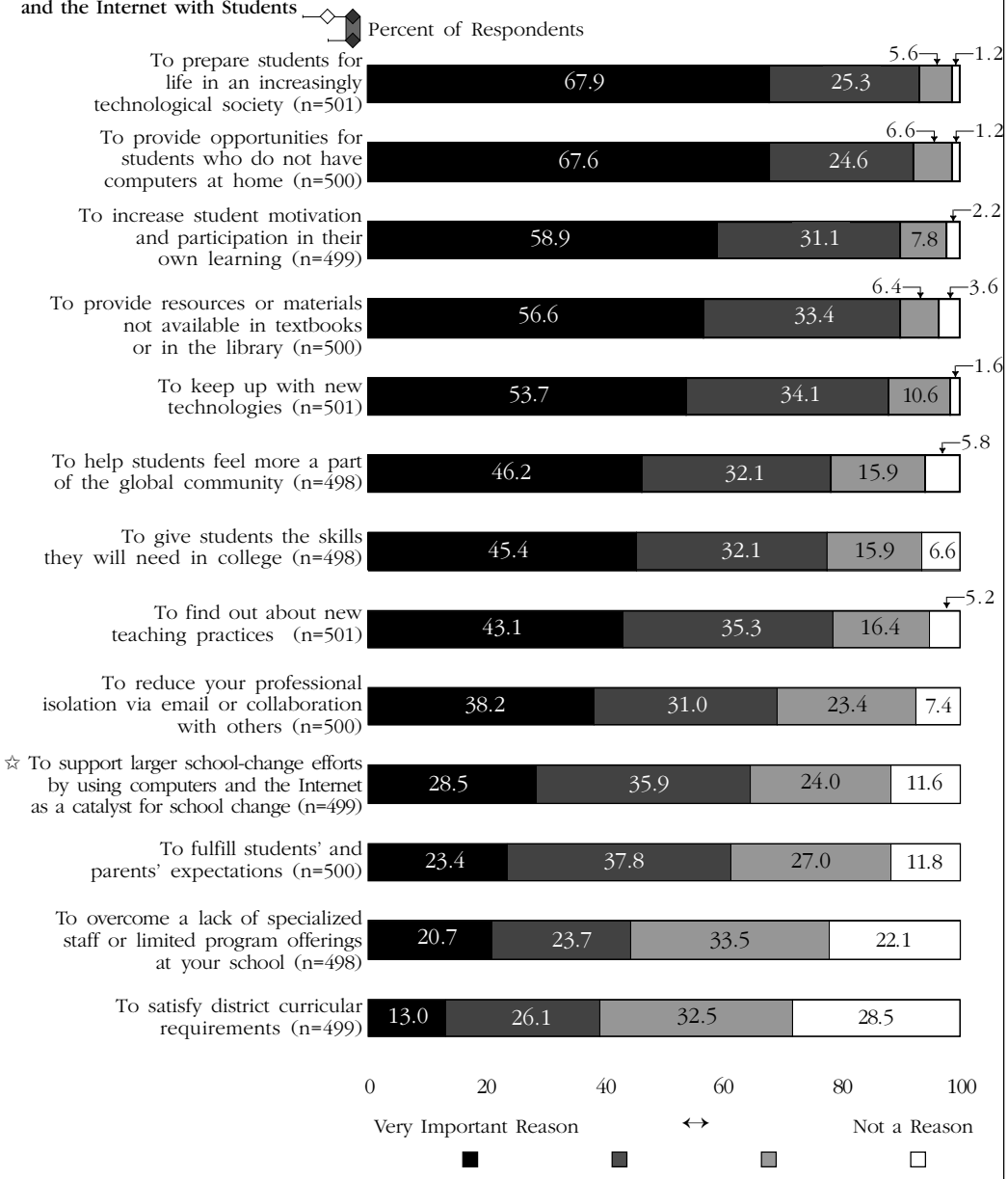
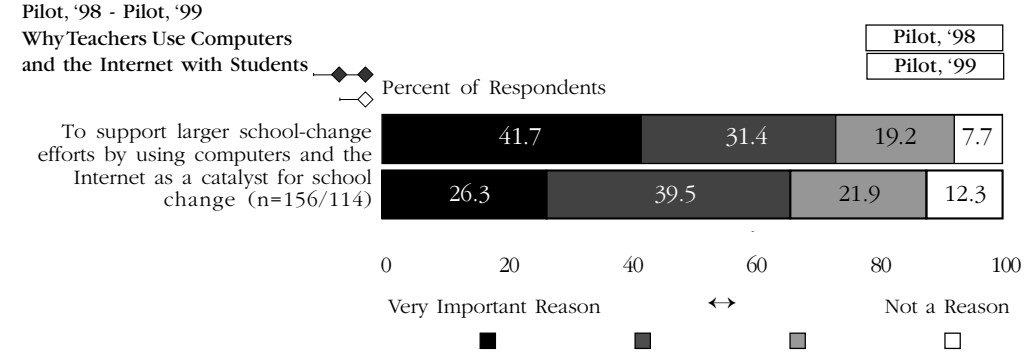


Figure 25b
Pilot, '98 - Pilot, '99
Why Teachers Use Computers and the Internet with Students



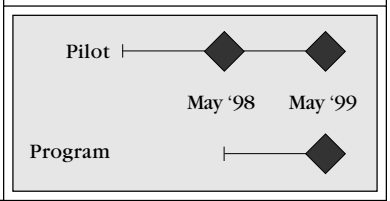
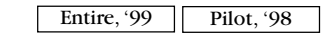


Table 1
Ranking of Six Reasons
to Use the Internet as
an Educational Resource



Mean Rank		Reasons to use Internet
Entire, '99	Pilot, '98	
4.0	3.1	Enables teachers to actively collaborate with other teachers across the country who share similar interests (n=483/150)
3.8	3.2	Enables students to communicate with other students across the world (n=480/148)
3.7	3.2	Enables students to participate in research and problem-solving with scientists and other specialists (n=482/148)
3.4	4.8	Provides access to a large variety of curriculum-relevant information for teachers and students (n=484/149)
3.1	4.1	Provides an opportunity for teachers to gather resources and construct their own curriculum units (n=487/151)
3.0	2.7	Provides a broader audience for each student's work, therefore making writing and other academic tasks more meaningful (N=480/147)

IMPACT ON STUDENT LEARNING

- Students are integrating multiple resources into projects, working more collaboratively with peers, and taking more initiative for their own learning.
- Technology is having an impact on students' problem-solving, data analysis, and data interpretation skills.
- RITTI teachers are continuing to develop new strategies for helping students use information technologies.
- Pilot and Program teachers observe similar improvements in their students' learning.

RITTI teachers have observed a number of positive changes in their students since their participation in the initiative. Close to two-thirds of respondents within the Entire cohort report that their students more often use a variety of resources in their research, work collaboratively with their peers, and work more on their own without direct teacher supervision. Expertise is more equally distributed among students of these educators, and teachers note that "average" kids are now communicating and producing in ways only "gifted" kids did before. They also acknowledge that their students feel more successful about themselves. For the majority of respondents, student performance on state- or city-mandated tests has remained constant (see Figure 26a).

Examining the responses of each RITTI cohort suggests that Pilot Year teachers in their second year of RITTI participation report more changes in their students' working collaboratively with peers and applying themselves for longer periods of time than do members of the Program group. These data also indicate that more than Program educators, Pilot teachers in their second year of RITTI observe that "average" kids are now communicating in ways that only "gifted" kids did before. Reflecting a change in the trends represented in most items in the survey, more Program participants than Pilot teachers report that their students have an increased interest in understanding the "adult" world (see Figure 26b).

Fewer Pilot cohort teachers report that their students use a variety of resources and that they work on their own without direct supervision now than they did a year ago (see Figure26c).

The Program cohort has nearly identical responses to the Pilot members after their first year of RITTI. When comparing these two groups, however, the Pilot cohort is more likely to report an increase in the use of a variety of resources by their students than did members of the newer RITTI cohort (see Figures 26d).

The use of technology is clearly making a contribution to learning for RITTI educators' students. Access to technology is having a positive impact on students' problem-solving, data analysis, and data interpretation skills. Teachers report that their students are more likely to be involved in problem-based learning activities, and are more apt to be learning through the process of interpreting and analyzing information resources. Teachers also believe that computers are helping their students acquire a host of pragmatic skills that range from technical know-how to effective communication strategies. How learning is taking place is changing as well. The use of technology is making it possible for students to engage in more interdisciplinary work, to collaborate with peers, and to be more involved in community-based issues (see Figure 27).

While technologies have significant potential to enhance and improve instruction and learning, we also know that using technology as a learning tool carries specific challenges such as quality vs. quantity; understanding of information resources; and equity and access issues. Close to half of RITTI educators within the Entire cohort observe that their students confuse finding information about a topic on the Internet with understanding that topic, and that their students tend to focus only on the technology aspects of projects. Nearly a third of respondents observe that their students are now more able to hide their lack of knowledge in a subject with the aid of technology and that students are apt to confuse quality of presentation with quality of content (see Figure 28a). Compared with their first-year responses, a few more members of the Pilot cohort now report that technology interferes with the teacher-student relationship after the second year of participation. More Pilot participants find that students confuse quality of presentation with quality of content than do members of Program cohort (see Figure 28b and Figure 28c).

Sources

Figure 26a
RITTI question 25.

Figure 26b
RITTI question 25.

Figure 26c
RITTI question 25; RITTI (1998) question 24.

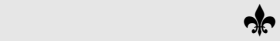
Figure 26d
RITTI question 25; RITTI (1998) question 24.

Figure 27
RITTI question 29.

Figure 28a
RITTI question 26.

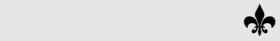
Figure 28b
RITTI question 26; RITTI (1998) question 25.

Figure 28c
RITTI question 26; RITTI (1998) question 25.



Vignettes

The music teacher in a suburban middle school joined the school technology committee after participating in RITTI in the summer of 1998. As part of his RITTI training he created a website for his students which includes a "class of the week" and "student of the month" feature. One unexpected result has been that his students now email him regularly with questions they "wouldn't ask during the day"; some students who don't speak in class now email him two or three times a week. Through email and the Internet he is more available to his students, to whom he sends notes ranging from a compliment to an assignment.

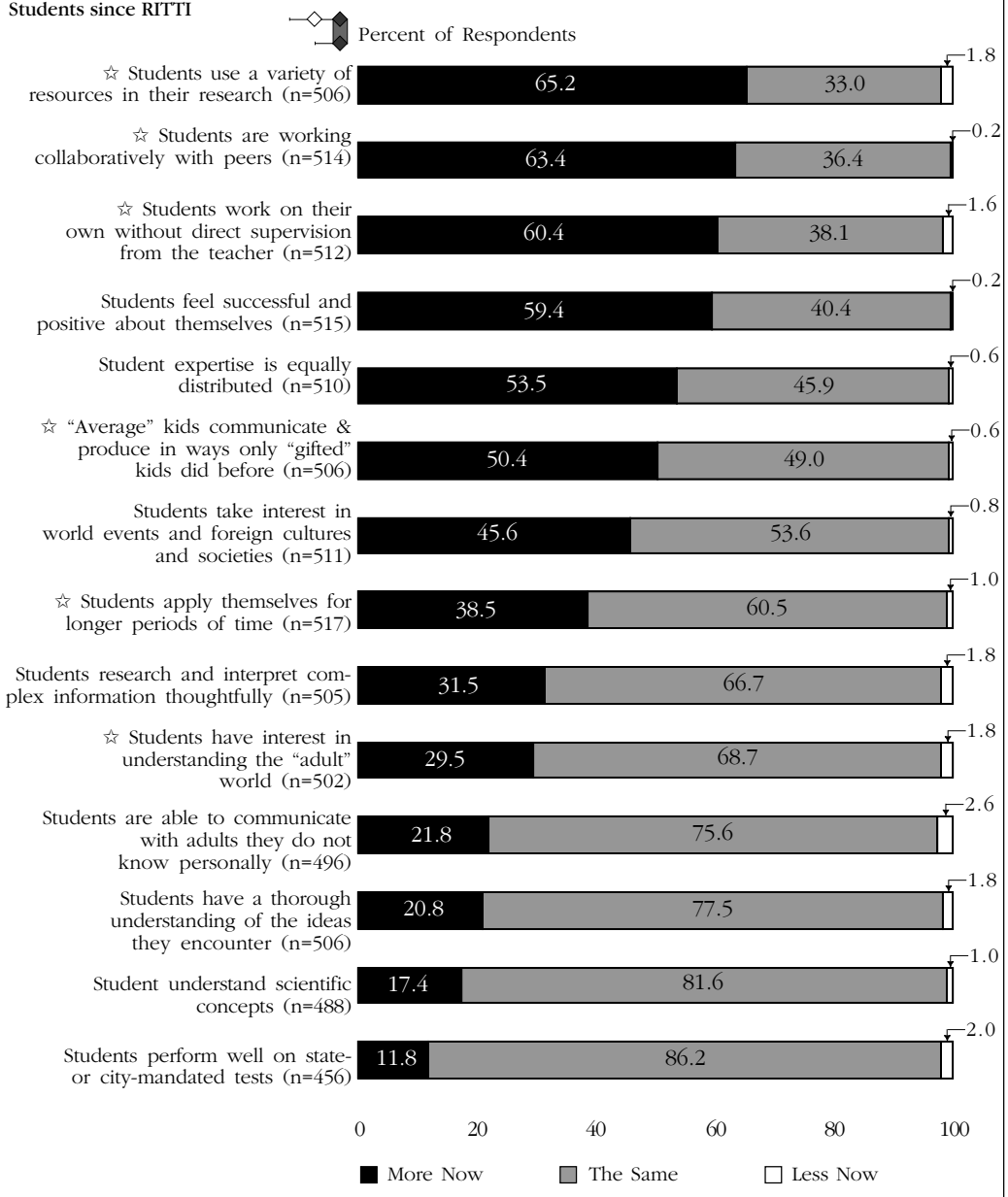


One challenge facing many educators is leveraging the vast resources available on the Internet without getting buried by superfluous or inaccurate information. This issue has emerged for teachers at one elementary school over the past year, with more teachers making use of the Internet since their participation in RITTI. Among those leading teachers in facing this issue are Mrs. Eastmon, the library/media specialist, as well as Mrs. Williams, the Multiple Intelligences instructor, who are focusing their work with teachers and students on information literacy.

Mrs. Williams focuses on helping students assess the validity of the data they find, using the information to come up with their own conclusions. Noting that a lack of time to locate appropriate sites is a common inhibitor of technology use, Mrs. Williams is currently developing a website with links to content areas that are appropriate for age and curriculum which could be used by teachers as well as students and parents.

Mrs. Eastmon describes information literacy as the need to "teach the children to be information literate in terms of awareness that some sites are not accurate or relevant and how to search for information." She and a second-grade teacher at the school have developed an approach to Internet searching designed for younger students, who frequently don't know how to even spell what they are looking for. In this process, which according to the second-grade teacher also meets the need to be more structured with students, students first brainstorm for what they know, then use print materials to gather more information, listing key words in columns. From those two columns they circle the key words which they check for spelling and then they're ready for the Internet. Otherwise, she tells us, it's "a nightmare!". She'd like to see students using the information to come to their own conclusions, not just as a textbook containing a set answer. She explained this approach saying that now, "you don't find information, you create it...If you're using the Internet as a worksheet you're selling it short". She understands that this process takes time and must be modelled by those teachers who have reached a level of expertise. One factor which reflects that this change is happening is Mrs. Eastmon's observation that there's more demand for technology in the school this year. She finds that students see the difference, too. "Linking school life with real life you aren't getting the 'why are we learning this' so much – it's no longer learning in isolation".

Figure 26a
Benefits Observed in Students since RITTI



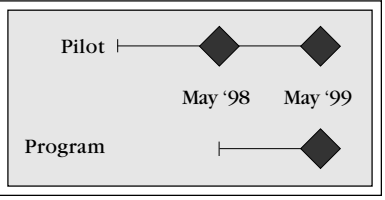


Figure 26b
Pilot, '99 - Program
Benefits Observed in
Students since RITTI

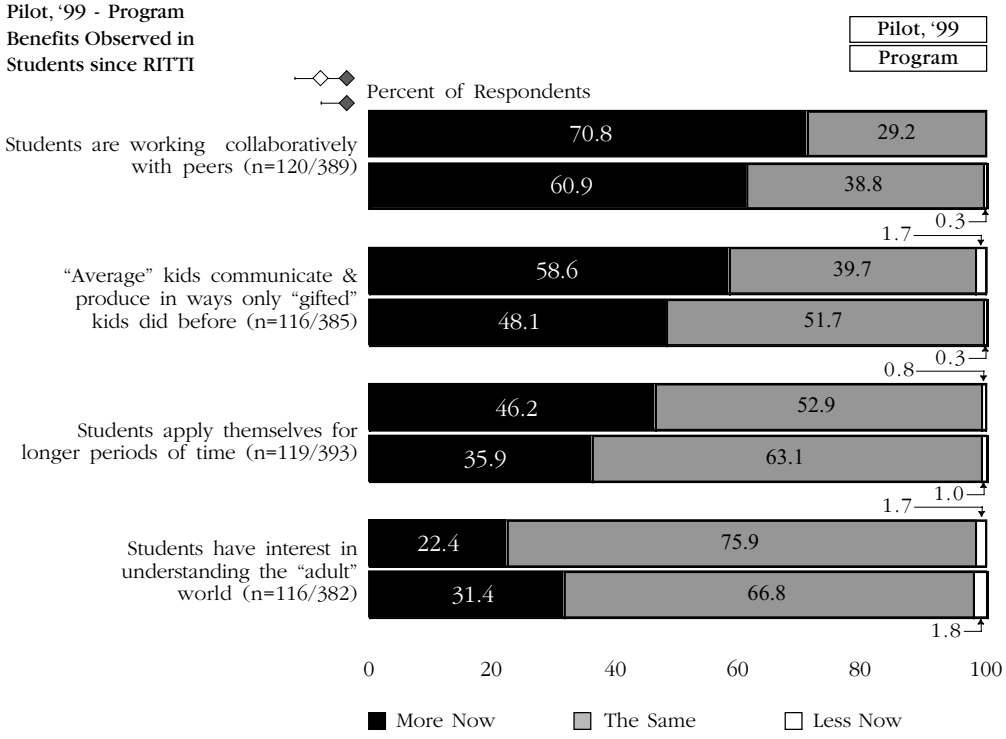


Figure 26c
Pilot, '98 - Pilot, '99
Benefits Observed in
Students since RITTI

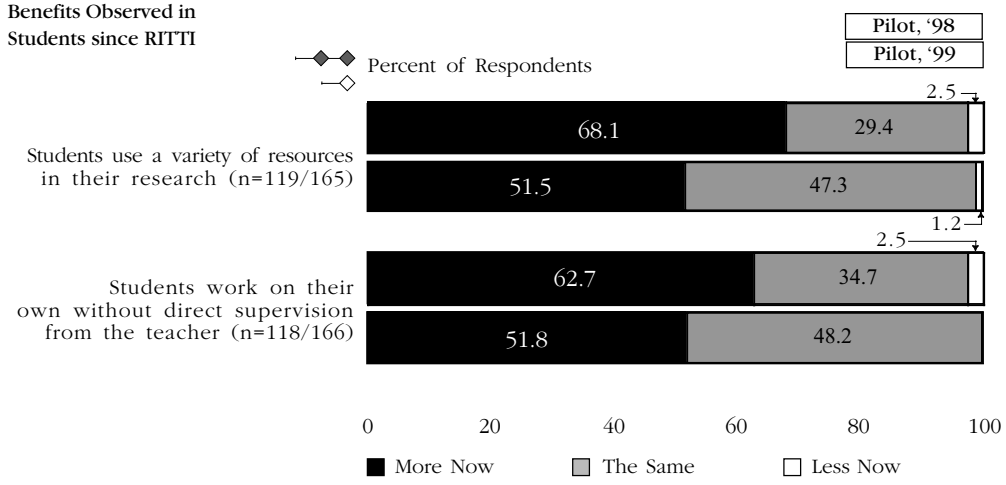
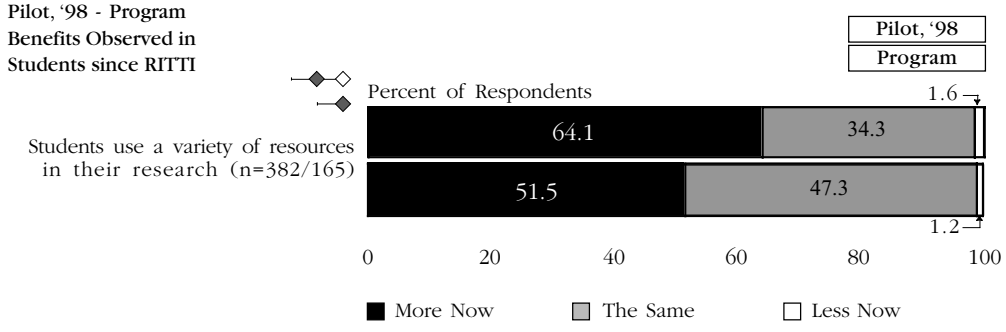


Figure 26d
Pilot, '98 - Program
Benefits Observed in
Students since RITTI



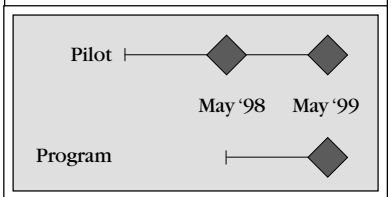
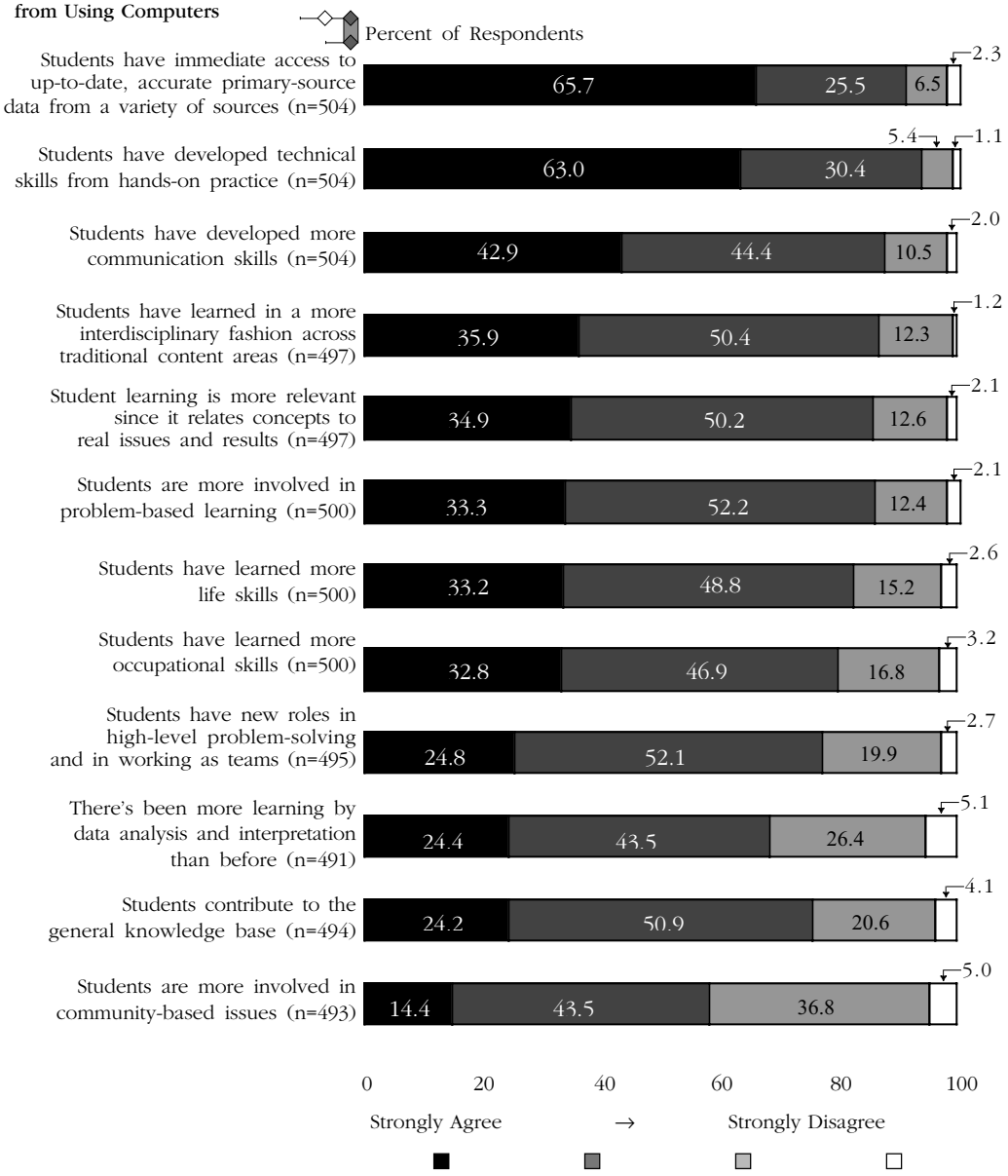


Figure 27
Contribution to Student Learning from Using Computers



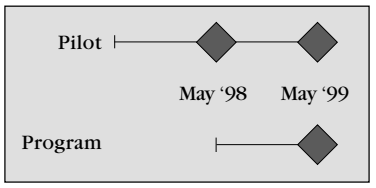


Figure 28a
Disadvantages of Using Computers with Students

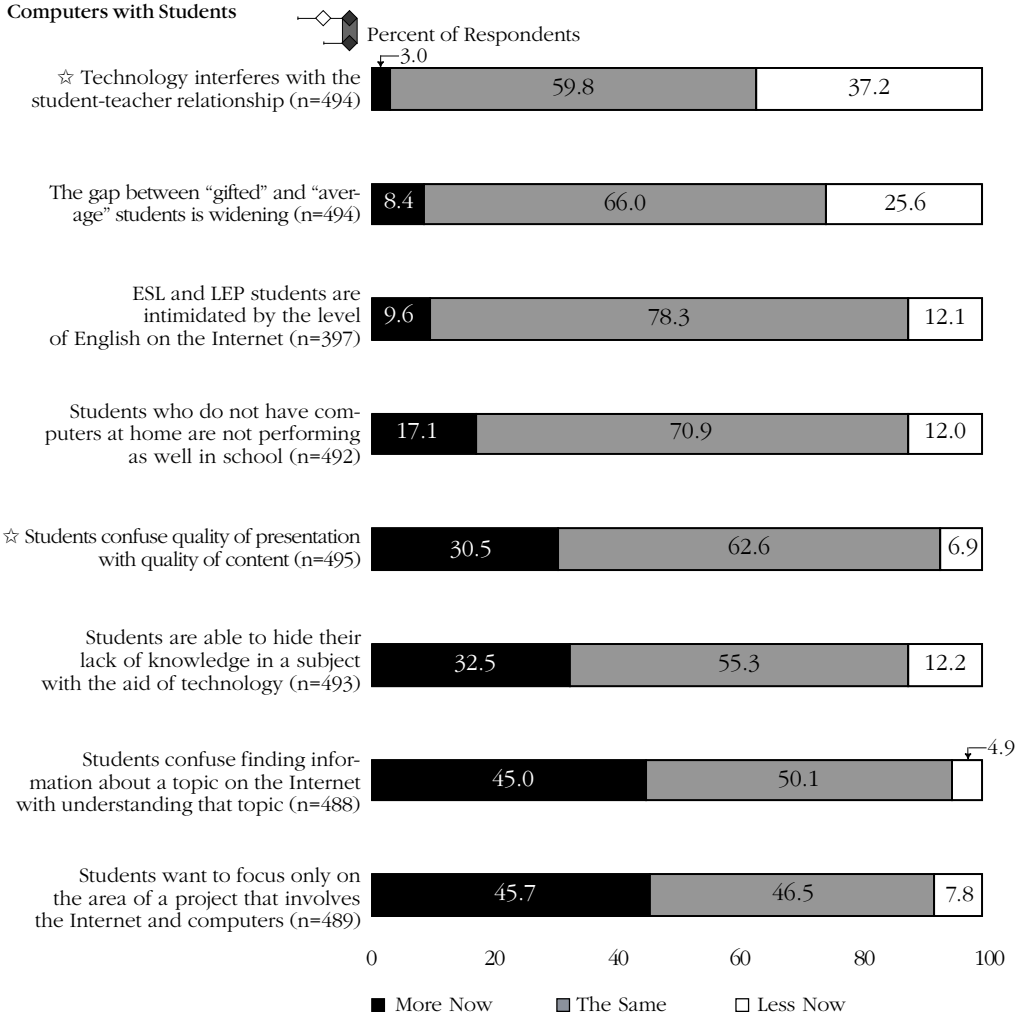


Figure 28b
Pilot,'98 - Pilot,'99
Disadvantages of Using Computers with Students

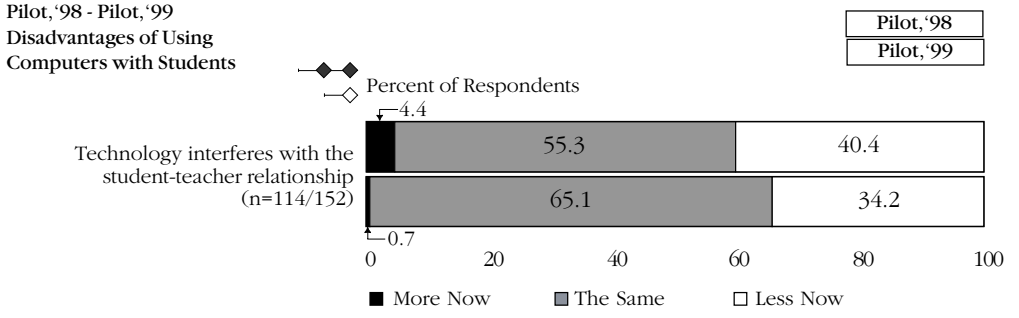
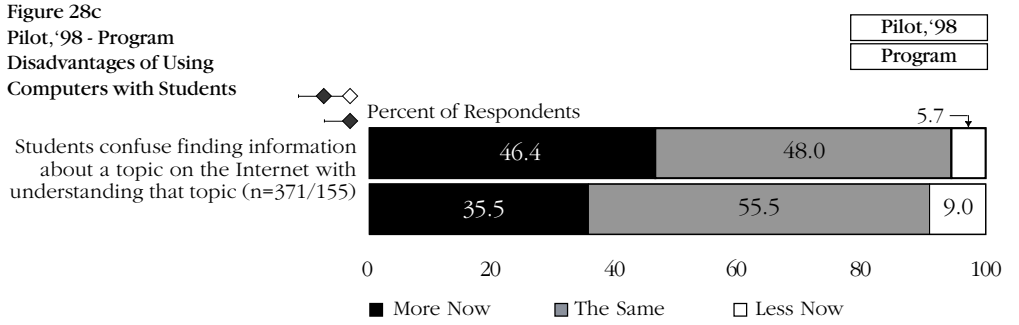
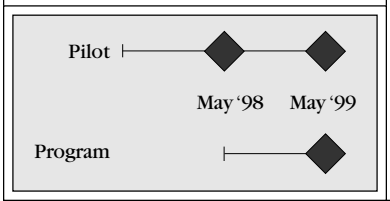


Figure 28c
Pilot,'98 - Program
Disadvantages of Using Computers with Students





THE RHODE ISLAND TEACHERS AND TECHNOLOGY INITIATIVE

There are several important reasons that respondents chose to participate in RITTI. Even more important than acquiring a laptop computer was the opportunity to receive intensive training. Nearly two-thirds of RITTI educators were motivated by the prospect of assuming a leadership role in their schools with respect to technology. Joining a supportive community is cited by over half of the respondents (see Figure 29).

Since participating in RITTI, many of these educators have taken on more responsibility in their schools and districts. Nearly half find that they more often have an opportunity to voice their concerns to decisionmakers, that they now are more frequently given updates and asked for feedback, and that their opinions are sought before decisions are made. These educators also find that they are more likely to have a trusted colleague to whom they can turn. Examining responses across the cohorts, the data indicate that in their second year of RITTI Pilot teachers experienced more dramatic increases in their participation in decisionmaking than did their Program colleagues (see Figure 30a and Figure 30b).

In addition to increases in decisionmaking roles, RITTI has also had an impact on respondents' involvement in technology-related activities at the school and district levels. Approximately two-thirds of respondents report that they are now assisting colleagues more through training and technical support and nearly half are helping create resources for their peers such as software or technology-related guidelines. These educators say that since participating in RITTI they are more engaged in developing ways of integrating computers into the school curriculum. RITTI teachers have also taken a larger role in policy-related issues by serving on technology committees, developing school and district policies around technology, and meeting with community and school board members (see Figure 31a). As with decisionmaking, the Pilot cohort reported more substantial increases in their involvement than did their peers in the Program cohort. Pilot cohort teachers reported more involvement after their first year than after their second year for some areas of technology-related activity. These respondents are now slightly less involved in developing school or district-wide policies and serving on technology-related committees. Fewer Pilot educators now choose to review and select hardware and software than they did after one year of RITTI (see Figure 31b and Figure 31c). This may be due to beaurocratic obstacles getting in the way.

The roles of these educators in their school communities have changed significantly as a result of their participation in RITTI. Almost all of these respondents either strongly (62.7%) or moderately (31.6%) agree that they now have more confidence in their capabilities in utilizing technology. Over three-fourths now feel they no longer have to rely upon the one designated technical support expert in their school and find that they are looked to by peers as a knowledgeable person with respect to technology. Among the other changes these teachers report are an increase in their participation in technology-related meetings and the extent to which they provide training and support to others. A number of RITTI educators have become more involved in grantwriting activities in order to help increase the use of technology at their schools. Pilot cohort members with two years of RITTI experience are more likely to offer technical support to colleagues than are teachers in the Program cohort (see Figure 32a and Figure 32b).

When looking at the responses of each cohort after one year of RITTI participation, the data suggest that Pilot teachers perceived a more pronounced change on their role in their communities with respect to technology than did the Program educators (see Figure 32c).

Another important aspect of this initiative is the extent to which it has reinvigorated teachers' commitment to their professional work. These educators overwhelmingly (81.4%) agree that RITTI has reenergized their commitment to their current job (see Figure 33).

- RITTI educators are taking considerable initiative in technology-related district activities; Percentage-wise, Pilot teachers are significantly more proactive as technology leaders in their schools than are members of the Program group.
- Paritcipants have developed enormous confidence in their own technical capabilities.
- They are
  - supporting their colleagues
  - helping to develop strategies for integrating technology into their schools' curricula
  - making decisions about hardware
- RITTI is reinvigorating teachers' commitment to their work.
- Participants rate the RITTI training experience as significantly better than other professional development experiences.

Sources

Figure 29
RITTI question 32.

Figure 30a
RITTI question 33; RITTI question 34.

Figure 30b
RITTI question 33; RITTI question 34.

Figure 31a
RITTI question 35; RITTI question 36.

Figure 31b
RITTI question 35; RITTI question 36.

Figure 31c
RITTI question 35; RITTI question 36; RITTI (1998) question 34; RITTI (1998) question 33.

Figure 32a
RITTI question 39.

Figure 32b
RITTI question 39.

Figure 32c
RITTI question 39; RITTI (1998) question 38.

Figure 33
RITTI question 40a.

Figure 34
RITTI question 37.

Figure 35a
RITTI question 38.

Figure 35b
RITTI question 38.

Figure 35c
RITTI question 38; RITTI (1998) question 37.

Figure 36
RITTI question 41.

The RITTI training addresses a variety of topics, all of which have been useful for participants. Most striking is the degree to which the Entire cohort benefited from the summer training, with over four-fifths rating it as extremely useful. According to these teachers, among the most valuable aspects of the program are ongoing help from the trainers and mentors as well as the support available from the RITTI listservs. In addition, over two-thirds of educators in the Entire cohort say that relationships formed with colleagues during the training has been an important aspect of participation in RITTI (see Figure 34).

The training also helped teachers to take the next step: improving instruction with the use of technology. To this end during the summer sessions participants applied their new expertise by infusing an existing unit of instruction with technology. RITTI teachers found this particular component of the training highly valuable because it helped them gain an understanding of how to integrate technology into their curriculum, and provided them with something they could share with colleagues and implement immediately with students (see Figure 35a). Members of the Program cohort found this part of the training more useful than did their Pilot cohort peers (see Figure 35b and Figure 35c).

RITTI educators are highly enthusiastic about their experience with this initiative compared with other professional development activities in which they have been involved. Over two-thirds of participants described the training as much better than other professional development experiences they have had; 92% found this training better than past training opportunities (see Figure 36).

Vignettes

Conversations as well as survey responses of RITTI educators across the state strongly indicate that RITTI has dramatically improved teachers' comfort levels with technology. Teachers at one elementary school attribute significant increases in their comfort with and knowledge about technology to the training as well as, in some cases, the purchase of a home computer. This comfort is reflected in teachers' increased willingness to use technology and the Internet with students. One teacher observed in her own practice as well as that of her peers that through the RITTI experience, confidence is increased, which leads to better use of existing resources. She finds that having time to practice gives her the confidence to bring it back to other people, and notes that "the kids benefit" from that diffusion. An educator at this school commented that conversations among teachers makes it "clear that people are trying to implement things they learned this summer [at the RITTI training]."

RITTI educators have become reference points with respect to technology in their schools. A Pilot year participant-turned trainer, Mrs. Kelley leads the technology committee, a key vehicle through which some RITTI participants are having an impact on technology use at her school. One educator described the technology committee as a place to bring things together in a system where teachers are "on their own" system wide. According to notes from a meeting of this committee, their goals are "to assist teachers in the use of technology to enhance the curriculum," and "to improve student achievement, through 'technology rich' curriculum". Among the key issues being addressed by the committee are how to become aware of and apply for grants, how to best train teachers in the use of technology, and how to improve ease of access to the computer lab in the school. Over the course of the year, these teachers targeted computer lab access and questioned administrators on policy decisions. Responding to

the constraints around computer use at the school, the committee redirected its energy to leverage other technology resources in the school, focusing on the library as a possible access point, where the librarian is a RITTI participant. The technology committee has also made a number of recommendations to the administration, including the hiring of a full-time technology support person and a redistribution of computers from the labs to the classrooms.

Mrs. Kelley's work gained recognition from the Rhode Island Foundation which selected her as one of twelve RITTI Fellows. In her role as a RITTI Fellow, Mrs. Kelley is working with colleagues statewide to look at technology integration's impact on student learning. Part of her motivation to help teachers integrate technology into their instruction comes from her understanding that technical skill does not necessarily mean technology integration skill.

Many teachers who have participated in RITTI cite professional collegiality as a major benefit. Mr. Jameson found that his contact with teachers in the state has increased due to the RITTI listserv as well as through activities that have grown in his school due partly to teachers' involvement in the initiative. According to Mr. Jameson, the creation of networks of "colleagues that come out of their caves more frequently and talk to one another" has been RITTI's biggest contribution to education in the state. "That's the only way education will change - if people talk more to one another."

Figure 29
Reasons for Participating in RITTI

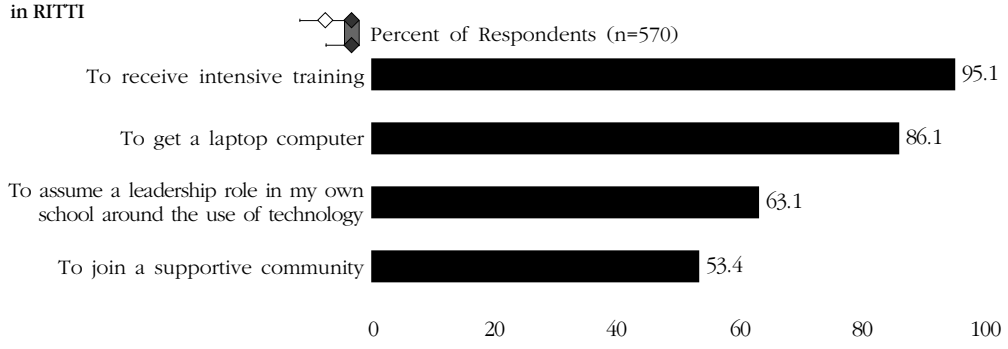
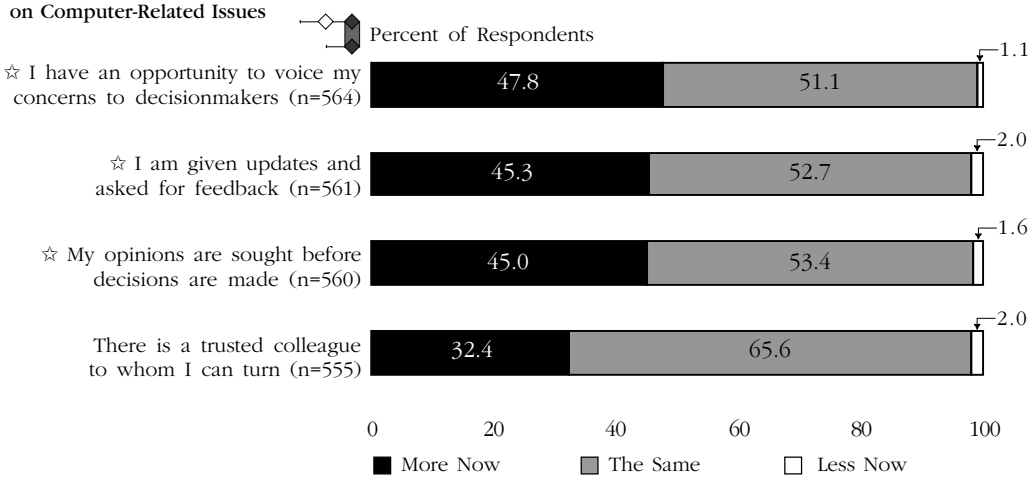


Figure 30a
How Often Teachers' Input Is Sought by Decisionmakers on Computer-Related Issues



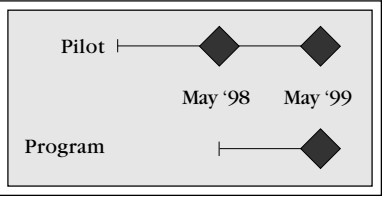


Figure 30b
Pilot, '99 - Program
How Often Teachers' Input
Is Sought by Decisionmakers
on Computer-Related Issues

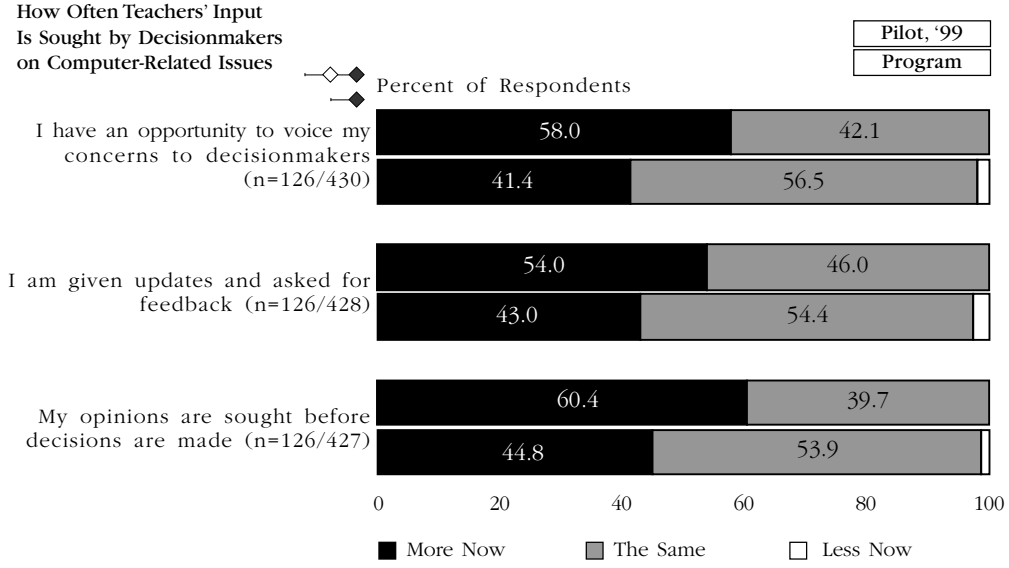
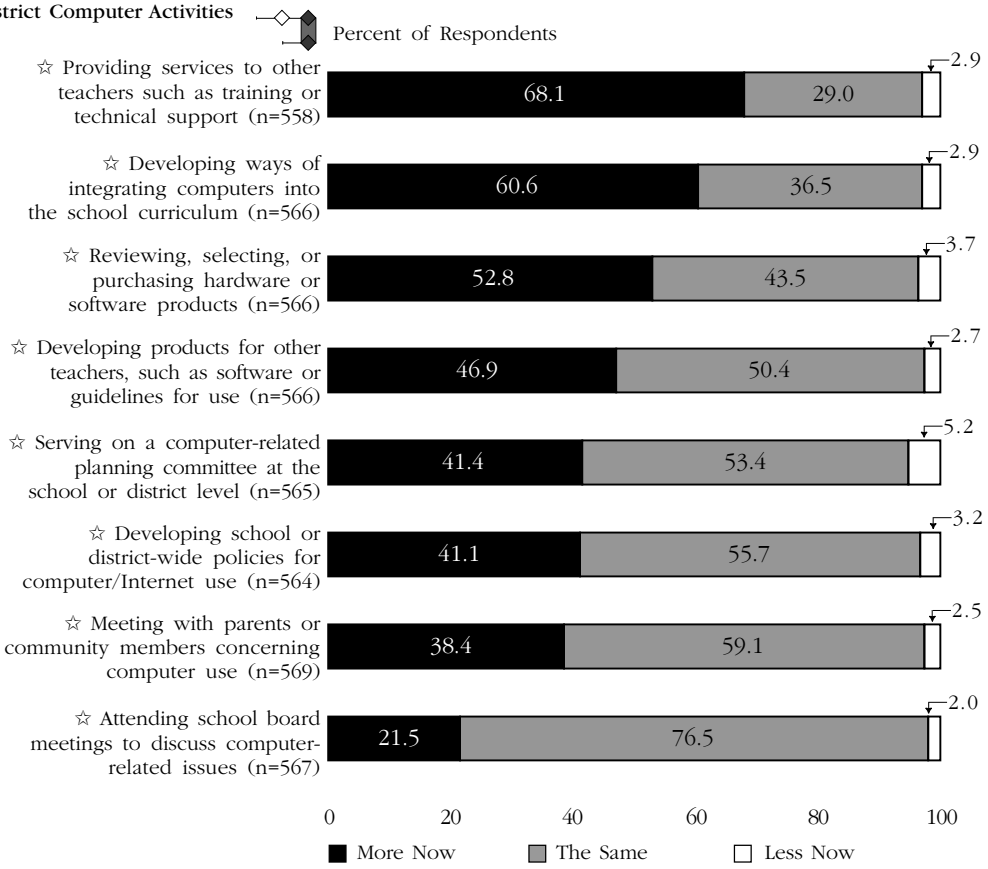


Figure 31a
Involvement in School and
District Computer Activities



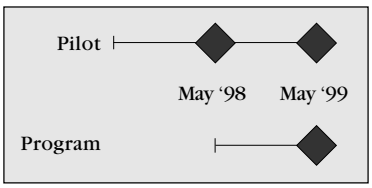
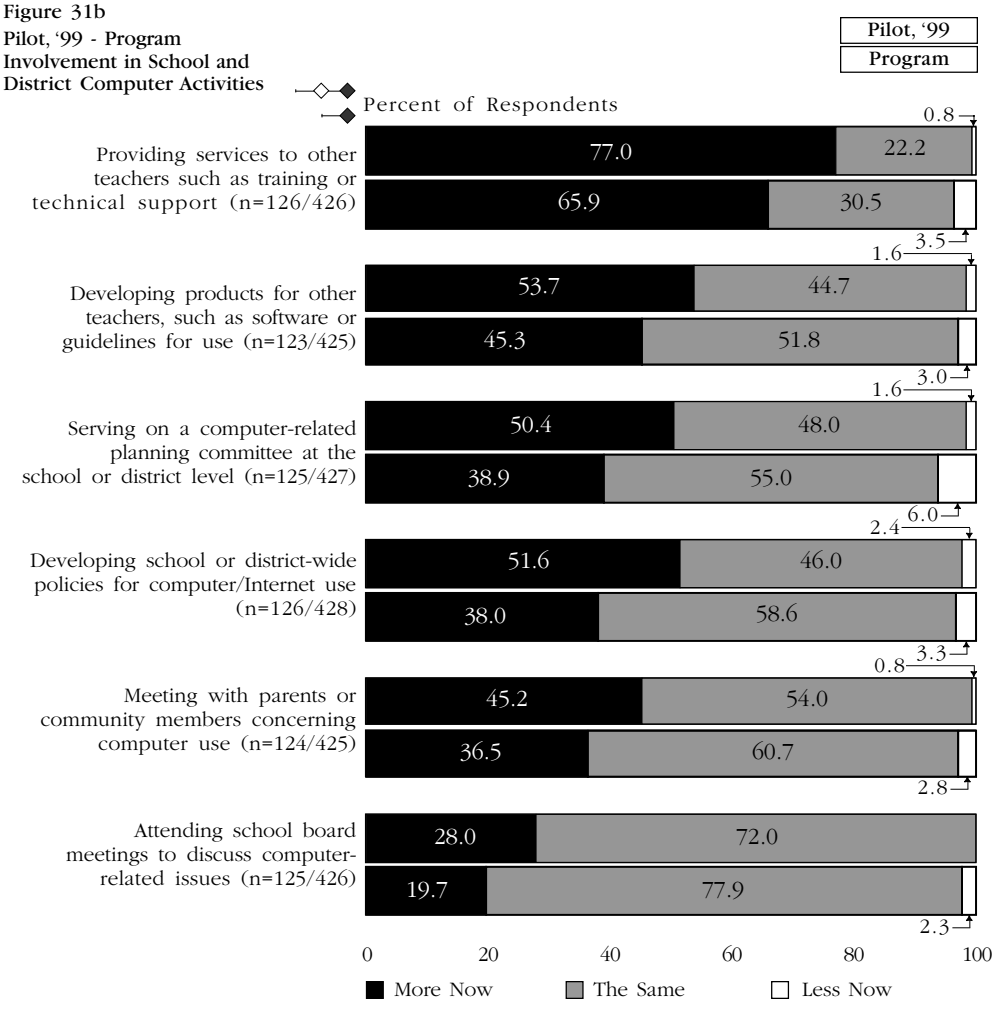


Figure 31b
Pilot, '99 - Program Involvement in School and District Computer Activities



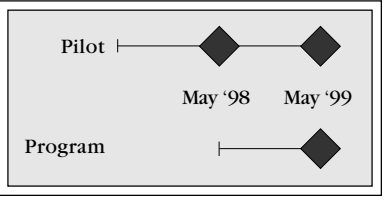
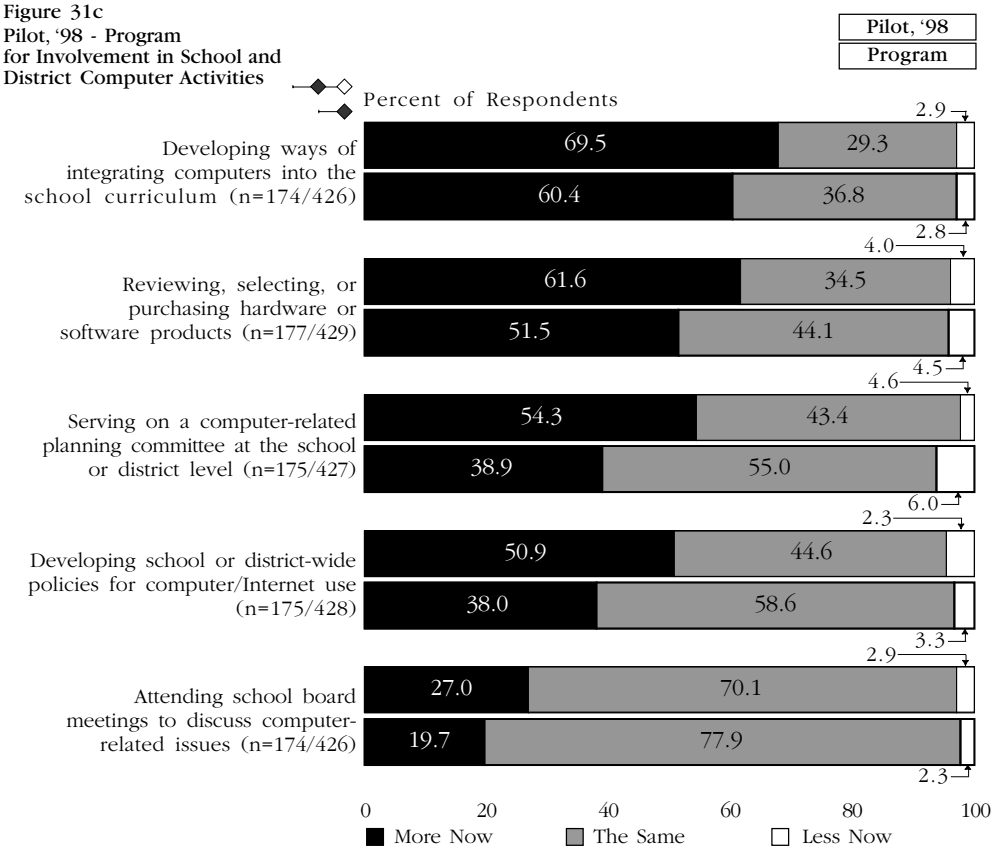


Figure 31c
Pilot, '98 - Program for Involvement in School and District Computer Activities



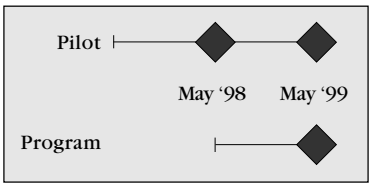


Figure 32a
Teachers' Perception of Impact of RITTI on Their Role in School Community

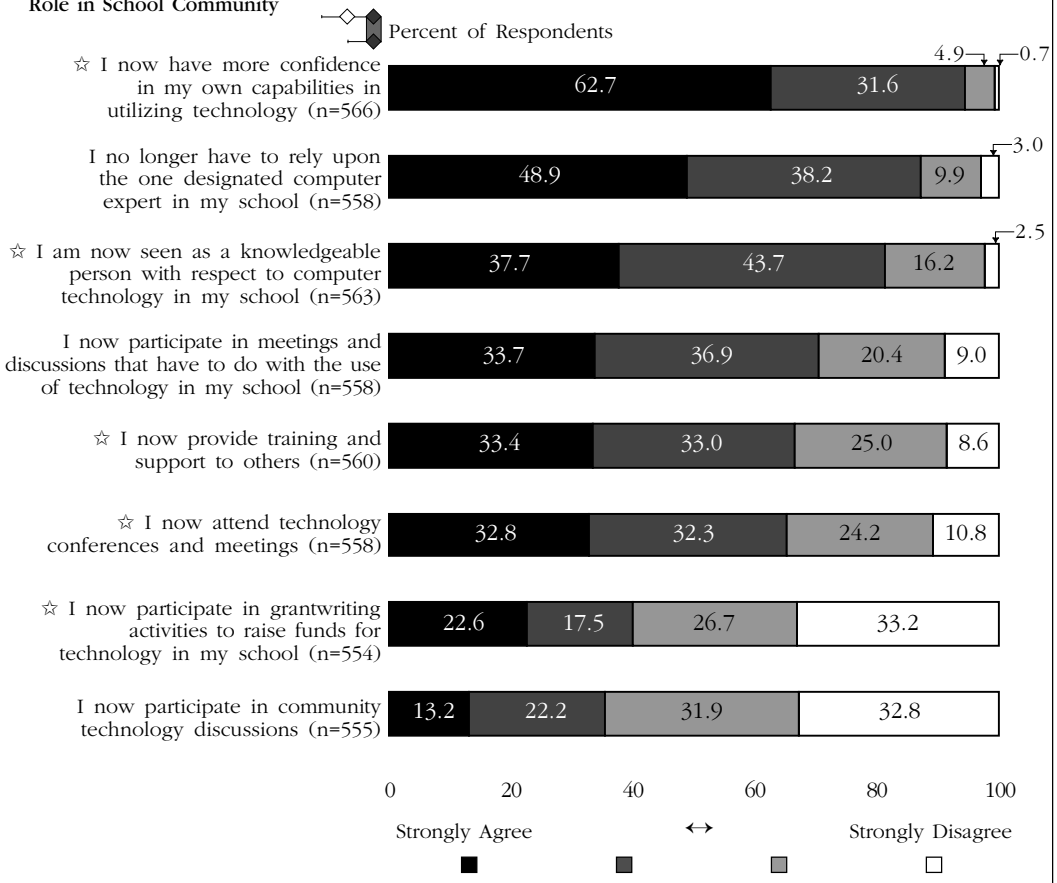
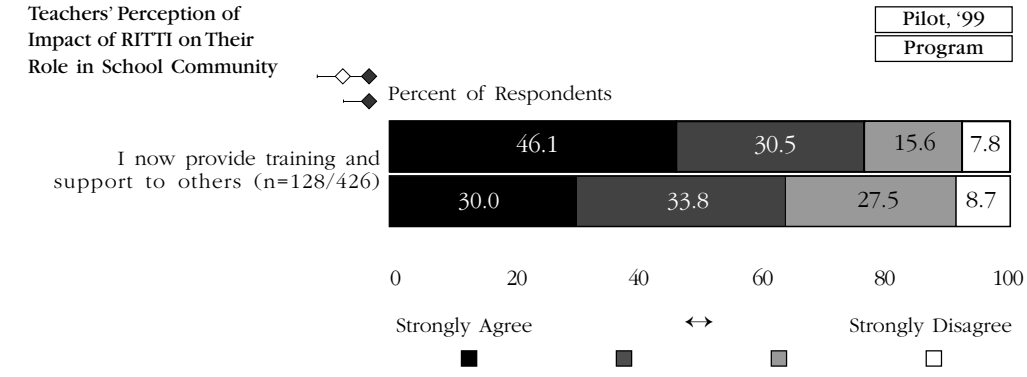


Figure 32b
Pilot, '99 - Program
Teachers' Perception of Impact of RITTI on Their Role in School Community



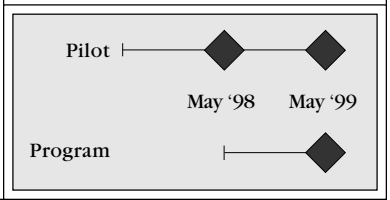
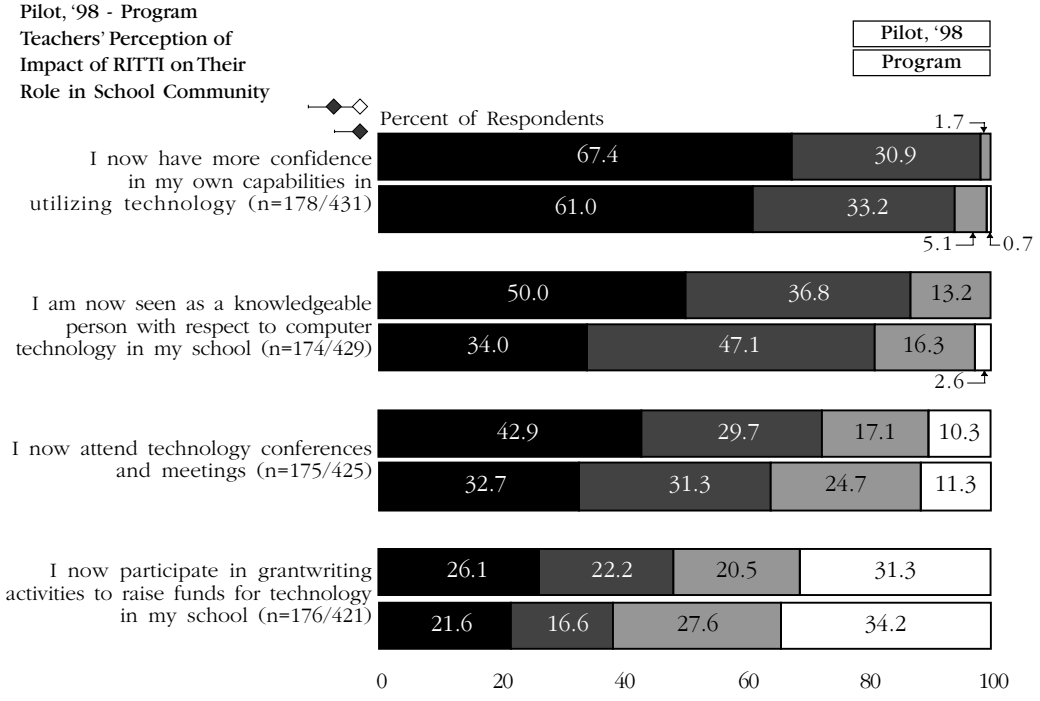


Figure 32c
Pilot, '98 - Program
Teachers' Perception of
Impact of RITTI on Their
Role in School Community



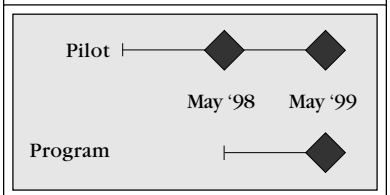


Figure 33
Teachers' Perceptions that RITTI has Reenergized Commitment to Current Job

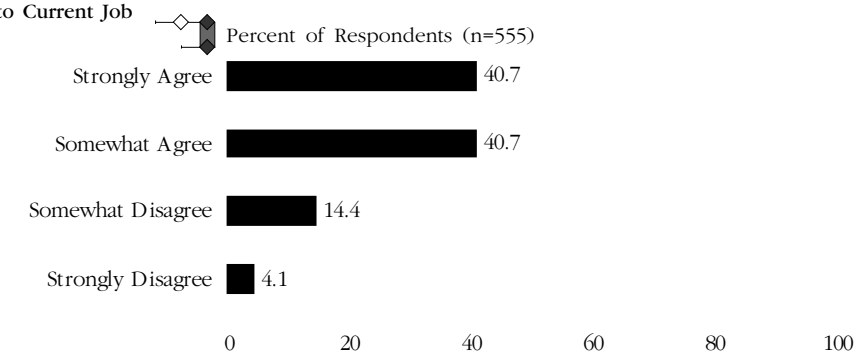
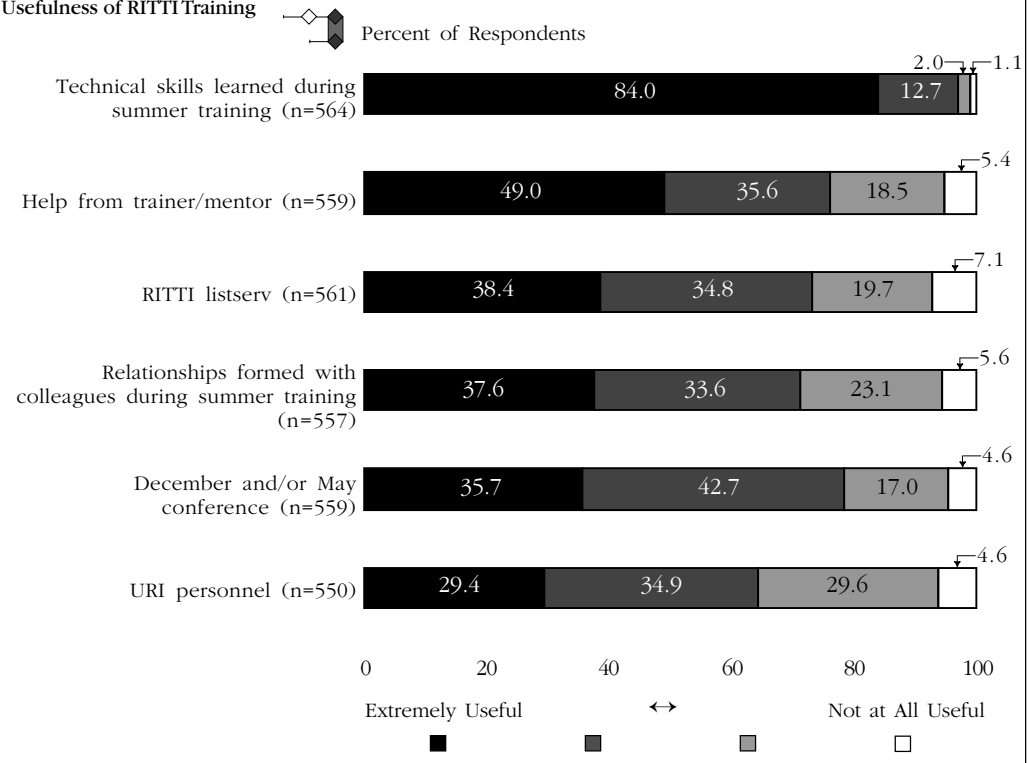


Figure 34
Teachers' Perceptions of Usefulness of RITTI Training



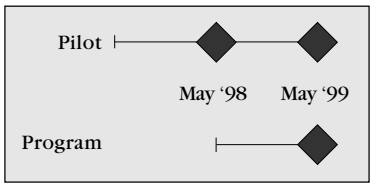


Figure 35a
Value of Learning to Integrate Technology into an Existing Unit of Practice

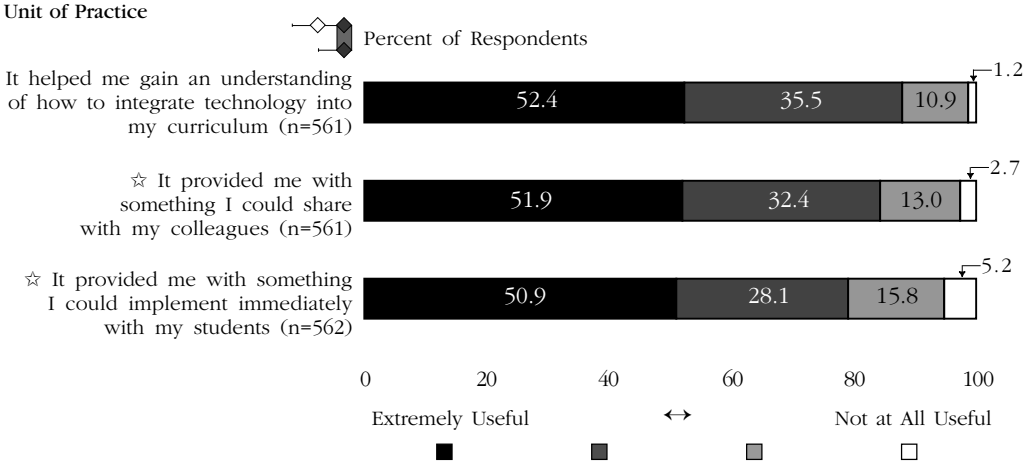
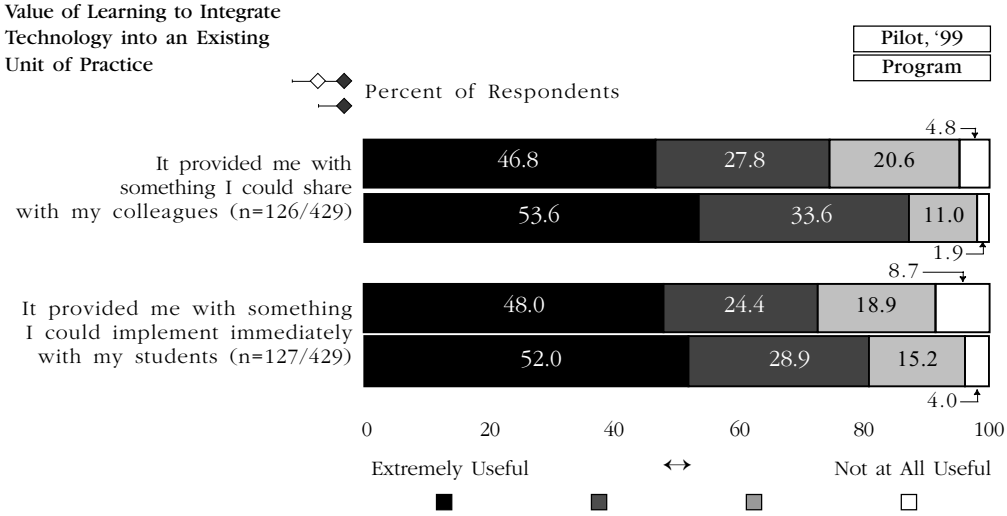


Figure 35b
Pilot, '99 - Program
Value of Learning to Integrate Technology into an Existing Unit of Practice



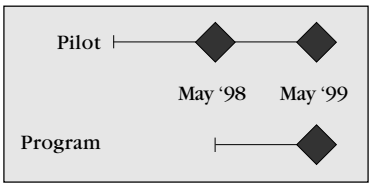


Figure 35c
Pilot, '98 - Program
Value of Learning to Integrate Technology into an Existing Unit of Practice

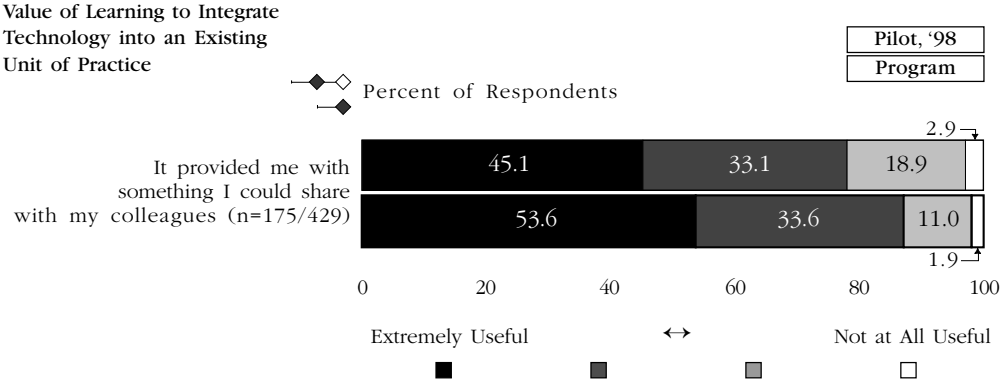
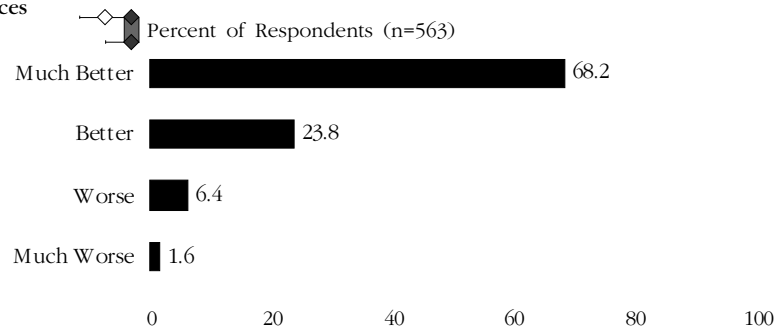
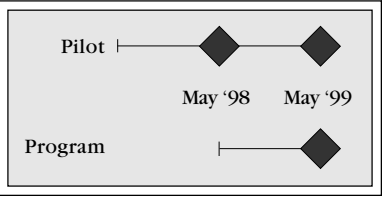


Figure 36
Value of RITTI Training versus Other Professional Development Experiences





BARRIERS TO USE OF COMPUTERS AND THE INTERNET

- The highest-rated barriers to the effective use of computers and the Internet include:
  - inadequate access to computers and the Internet in schools
  - lack of time in the school schedule to conduct technology projects
  - lack of school-based technical support
  - lack of training opportunities for computer and Internet projects
- Lack of training opportunities and restrictive school policies are greater barriers for Year II teachers than for Pilot educators.

The use of technology to aid instruction carries with it many challenges. We asked respondents a number of questions in order to better understand the factors which impede teachers' use of technology. The majority of RITTI educators cite a lack of computers and a lack of Internet connectivity as prominent barriers to their technology use. Other factors impeding their use of technology are a lack of time in the school schedule for computer- or Internet-related projects, and inadequate communication about technology resources. Training is also an issue for respondents, with many perceiving that there are insufficient training opportunities and a lack of technical support for computer projects. Most of these educators do not consider a lack of age or educationally relevant websites as a barrier to their use of the Internet with students.

Looking across responses of the two cohorts, the data indicate that the Year II Cohort perceive themselves as more constrained by school and district policies and a lack of training opportunities with respect to technology than educators in the Pilot Cohort (see Figure 37a and Figure 37b).

Vignettes

In many of the schools we visited, limited access to computers and the Internet were among a variety of the factors which made it difficult, or even impossible, for teachers to make regular use of technology in their classroom instruction. In some cases, resources available in the school were underutilized due to poor internal communication. Other challenges faced by educators in the observation sites include bureaucratic policies which restrict access to technology resources, reluctance to invest school or district funds in technology infrastructure in anticipation of Erate funds, and limited time in the school schedule for computer and Internet projects.

Teachers in one large urban high school are currently awaiting wiring, with Erate funds expected to cover this expense. However, as of our last visit to the school no date had been set for the start of the work. In the library are a number of computers, arranged in four clusters, which teachers frequently reserve for use with their classes on a first come, first serve basis. These library computers are accessible to all disciplines; while there are other computer resources in the school, they are the property of specific departments, reflecting the school's departmental nature. For example, a computer lab in the school is administered by the math department, since the computer science classes are taught through that department. Mobile labs consisting of laptop computers and various probes have been purchased by the science department.

In the same school the library purchased mobile carts with computer, LCD panel and projectors, and printer for use by teachers on a sign-out basis. The librarians lamented that these carts were not being used, and attempted various strategies to get the word out to teachers. Somehow the lines of communication failed, since several teachers we spoke with did not realize they had access to this resource.

In the only computer lab with Internet access at one school we visited, students meet regularly for the enrichment program run by Mr. Romano. Sixth-grade students in the gifted-and-talented program meet daily with Mr. Romano in a pull-out program; seventh- and eighth-grade enrichment students meet weekly. Mr. Romano, whose time is split between two schools in the district, tells us that his students use the Internet almost every time they meet with him for class. Other teachers in the school may request use of the lab during periods when enrichment classes are not taking place. Mr. Romano coordinates the scheduling of this lab, and only he and the secretary at the main office have the key. There is a specific procedure for teachers to follow in order to gain access to the lab. This procedure, described by Mr. Romano, is outlined below.

1) Teacher fills out a form and requests the period during which access is desired.
2) The form then goes to the teacher's department chair for approval.
3) Once department permission is granted, the form is sent to Mr. Romano, who selects the day on which the requested period is available.
4) The teacher then receives a notice with the date and time for which the access is approved.
5) The teacher brings this notice to the main office at the time of the class.
6) The secretary checks the log to make sure the teacher has been given permission to use the lab, at which point the lab key is made available to the teacher.

When we spoke with him in February of 1999 Mr. Romano reported a "noticeable lull since Thanksgiving" in teachers'use of the lab, mentioning technical problems as a deterrent to teachers. He finds that those who aren't comfortable with the technology don't use the lab, and explains that many teachers don't understand the legalities that prevent him from loading content-specific software onto the lab computers without a site license.

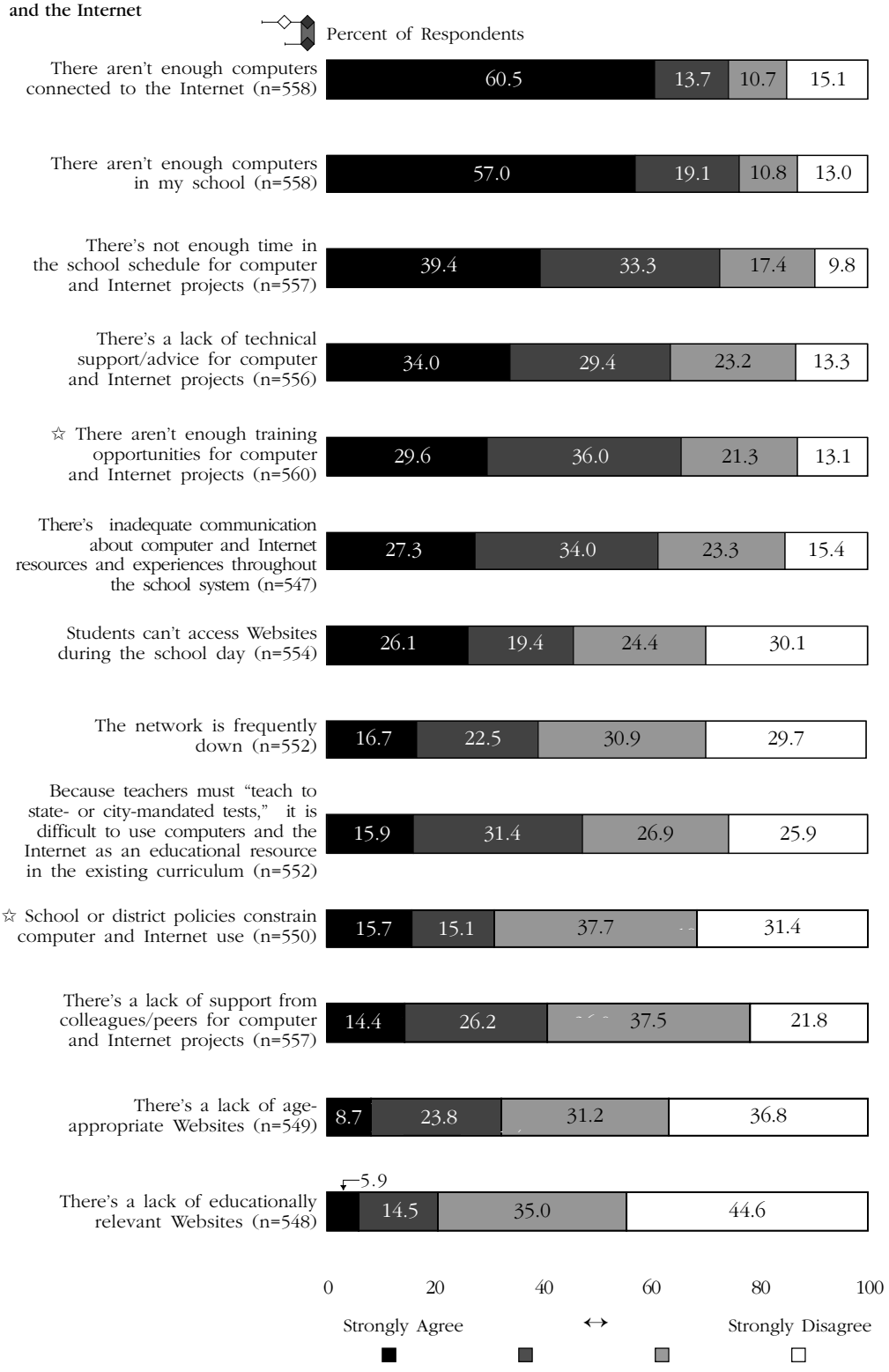
Conflicting reports from a range of administrators and educators we spoke with at this site put into question the degree to which the administration is making an effort to support access to technology for all students in the school. According to the vice principal, the grant which funded the creation of this lab was written "specifically for a lab to serve the whole school." However the policies in place translate in practice to infrequent access for students outside the gifted and talented program.

Sources

Figure 37a
RITTI question 46.

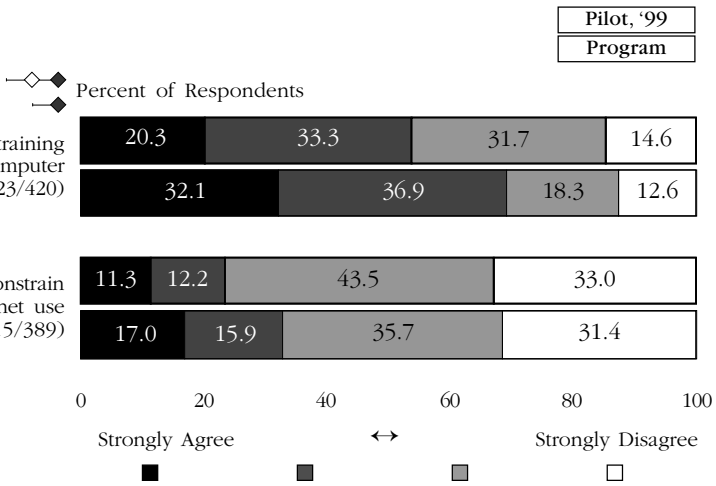
Figure 37b
RITTI question 46.

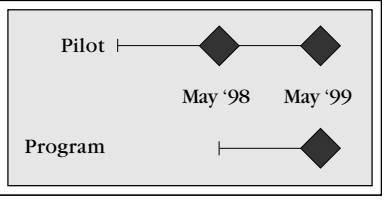
Figure 37a
Barriers to Use of Computers and the Internet



Pilot
May '98 May '99
Program

Figure 37b
Pilot, '99 - Program
Barriers to Use of Computers and the Internet





TECHNOLOGY INFRASTRUCTURE IN RESPONDENTS' SCHOOLS

- RITTI respondents' schools are greatly ahead of schools nationwide in terms of Internet access.
- Technology infrastructure in participants' schools is at a higher level compared to with the previous year.
- Nearly all schools in which RITTI educators work have Internet connectivity; most RITTI teachers have access to computers and the Internet during the school day.
- Funding for RITTI schools' technology has come from a variety of sources, including foundation, corporate, government, and grassroots efforts.

Rhode Island schools are well ahead of nationally reported numbers with regard to school Internet connectivity. The vast majority of RITTI respondents note that their schools have access to the Internet (91.5%), as compared with just under two-thirds of schools nationally. This reflects an over 10% increase compared with Pilot responses in 1998. This increase in connectivity is also indicated in the type of connectivity in respondents' schools. Instead of modem dial-up connections, more schools are using 56K and T1 connection speeds than reported during RITTI's Pilot year or by national data (see Figure 38 and Figure 39).

RITTI teachers have access to a variety of Internet resources at their schools. Nearly all have access to the World Wide Web (98.6%) and news groups (95.4%). Email is accessible to over two-thirds of RITTI teachers (see Figure 40).

RITTI teachers also have substantial access to computers for class preparation during the school day. Nearly three-fourths (72.2%) report access on most days. Only 5% report no access at all. Most of these teachers also have access to the Internet during the school day as well. Access to the Internet is slightly behind computer access, with nearly one-fifth of respondents reporting that they never have Internet access during the school day (see Figure 41 and Figure 42).

Internet connectivity in respondents' schools has been funded by a number of sources. Most frequently cited by RITTI participants are grants from foundations, corporations, or the government. Approximately a quarter of respondents note that the phone company and the initiative of teachers have contributed to Internet connectivity in their schools (see Figure 43).

RITTI educators note that various individuals have served as catalysts for technology issues in their schools and districts. For many respondents, another teacher, technology coordinator, or media specialist have played significant roles in this respect. Principals and district-level technology coordinators are also recognized by RITTI educators in having an impact on their schools' technology agenda (see Figure 44).

Vignettes

Changes in technology use are also reflected in an increase in RITTI teachers' requests to use and purchase technology at their schools. At one school in particular, equipment purchases are up, including devices, such as digital cameras and scanners, of which many teachers at the school have only recently become aware. These new technologies are in demand in the school by a number of teachers. There is also talk amongst the teachers about buying computers for home use, reflecting a change that has taken place over the last two years.

Access to the Internet in schools has received great attention given the country's policy to wire every school by the year 2000. While strictly speaking, nine out of ten respondents have access to the Internet at their schools, this figure is easily misleading. One school in this study is among the ninety percent with Internet access. In this school, which is organized in grade-level clusters, each grade level has several computers ranging from Apple II's to PowerMacs, and most of their software was purchased through the Apple bundles. The teachers in each grade decide how to locate the computers within the cluster: some choose to have one per classroom, others have all the computers in the cluster common space. The library also has two computers, one of which is the

RITTI laptop belonging to the school's library/media specialist. In terms of connectivity, the school is anxiously awaiting wiring, which was promised by the district for the start of the 1998–99 school year. Throughout that year, that date has been pushed back, first to December of 1998 and then to summer of 1999. In the meantime teachers have limited connectivity through a single shared phone line accessible via one jack in the second- and third-grade clusters and one jack in the library. This lack of access clearly makes regular school-day use of the Internet and email impractical.

The push for Internet connectivity as well as increased access to computers has grown as RITTI teachers at this school have become more aware of the possibilities of technology for instruction. Teachers have also requested access to other technologies such as projection devices. Mr. Eisen, the principal, has responded to this situation in part by submitting a request for 6-10 new computers within the school budget. With the coming school year, the new computers will make it possible to allocate 1-2 computers per classroom. Mr. Eisen hopes to have sufficient computers to keep some in the clusters for group work.

Figure 38
Internet Connectivity

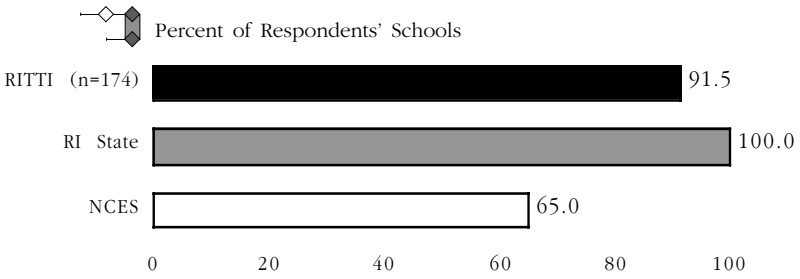
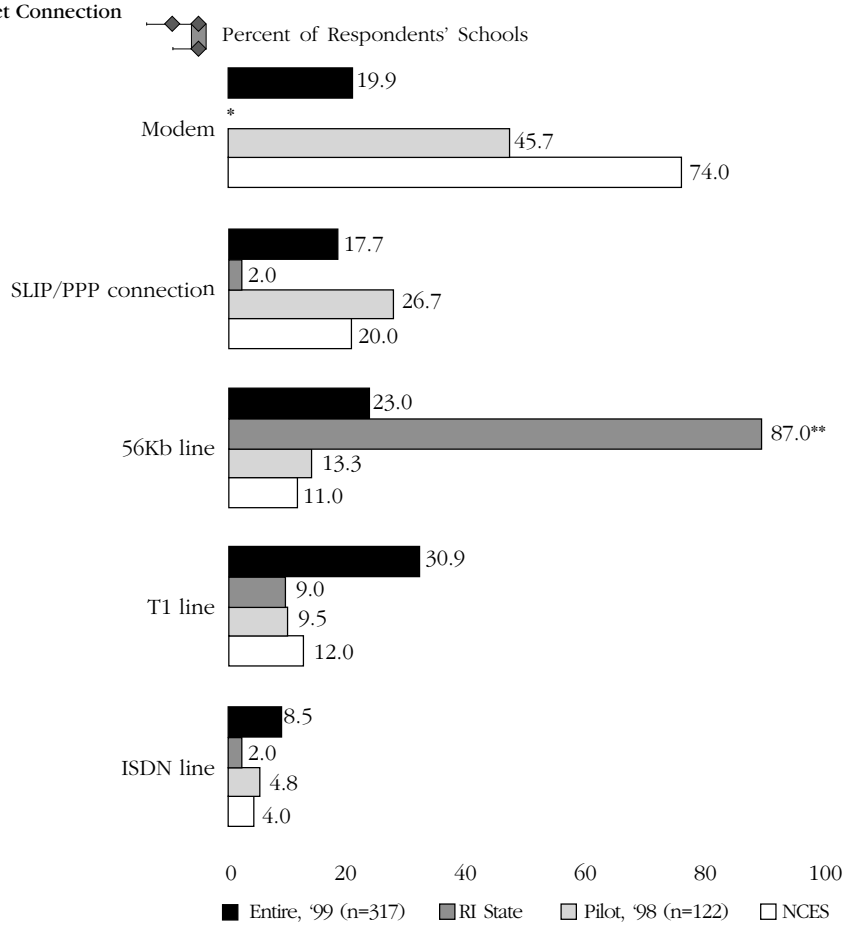


Figure 39
Type of Internet Connection



** Modem and SLIP/PPP combined = 2%*
*** Includes 27% with 384Kb line*

Sources

Figure 38
RITTI question 56; Information Works (1998); NCES (1996), p.7, Figure 3.

Figure 39
RITTI question 57; Information Works (1998); NCES (1996), p.5, Figure 1.

Figure 40
RITTI question 58; Information Works (1998); NCES (1996) p.8, Table 3.

Figure 41
RITTI question 11.

Figure 42
RITTI question 12.

Figure 43
RITTI question 59.

Figure 44
RITTI question 63.

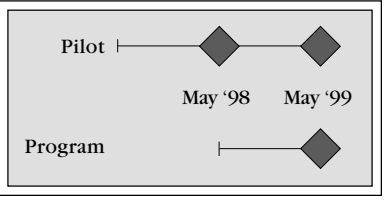


Figure 40
Availability of Internet Resources at School

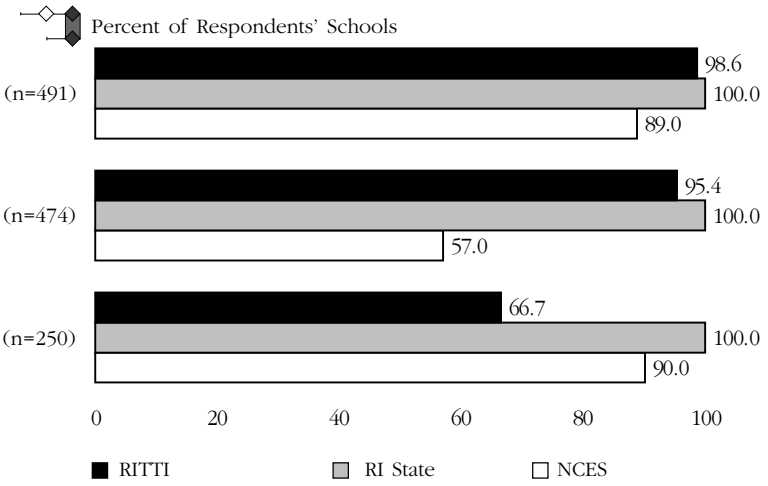


Figure 41
Frequency of Access to Computers for Class Preparation during the School Day
N.B. Does not include the laptop received from RITTI.

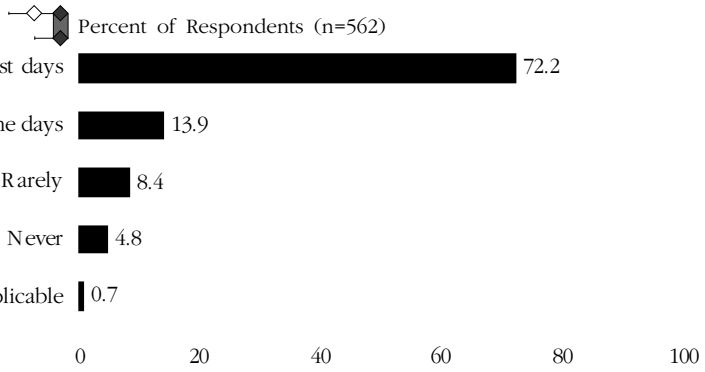
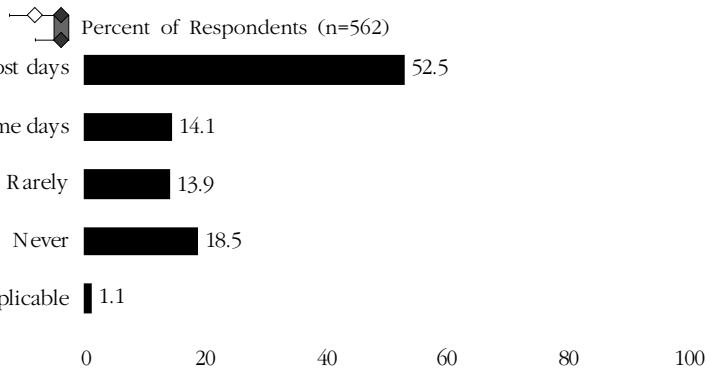


Figure 42
Frequency of Access to the Internet for Class Preparation during the School Day



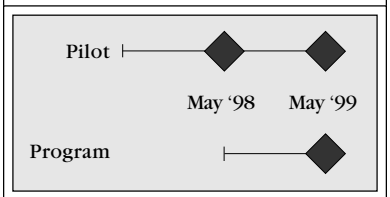


Figure 43
Funding Sources for Internet Connectivity

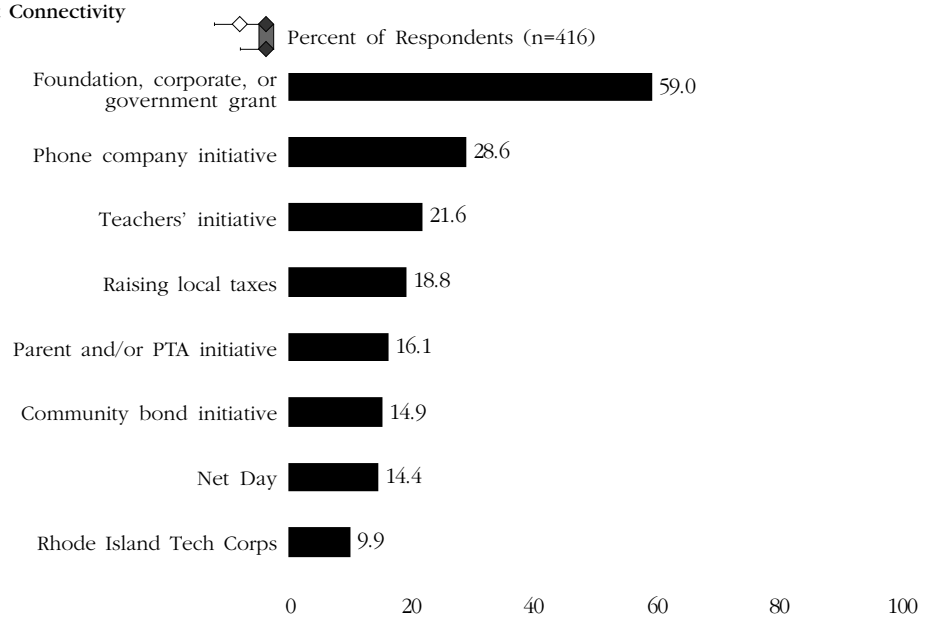
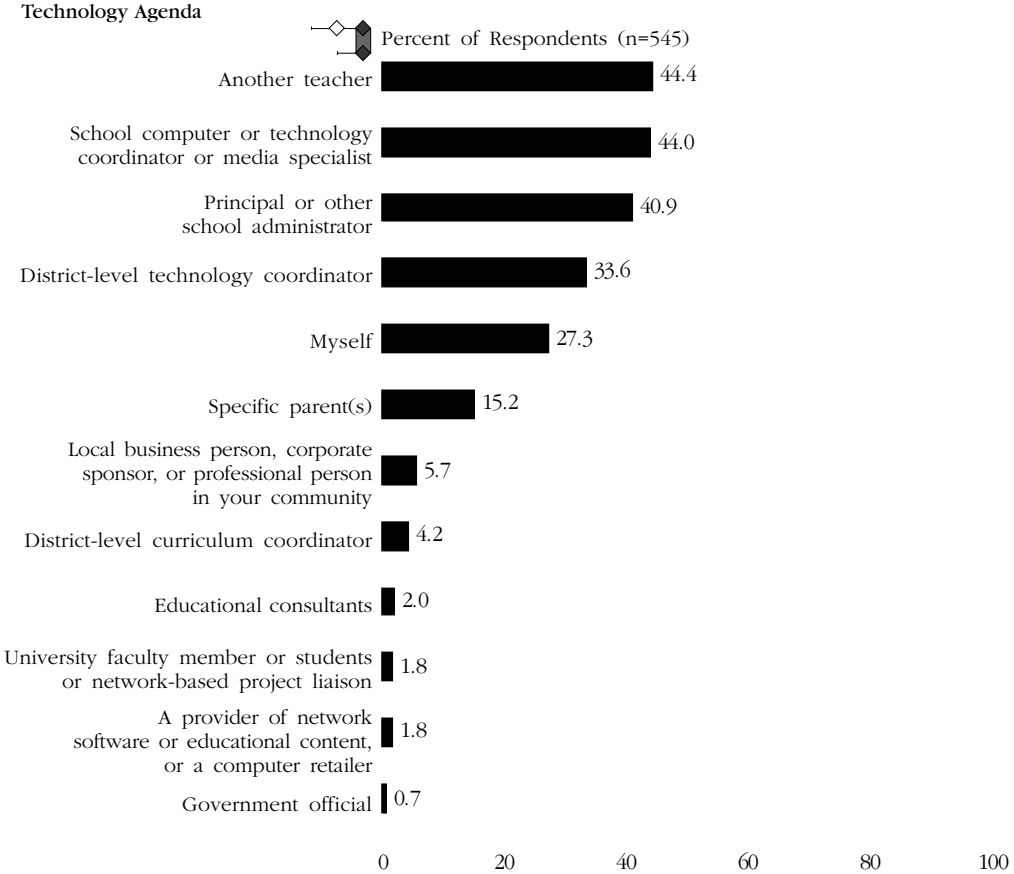
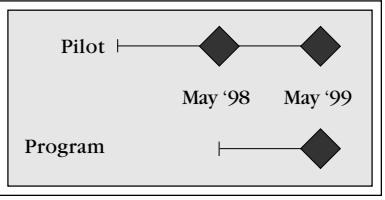


Figure 44
Catalyst for Schools' Technology Agenda





CONCLUSION

The Rhode Island Teachers and Technology Initiative (RITTI) represents a significant statewide effort to put teachers at the center of innovating with computer and telecommunications technology. The reach of the program to date is substantial. After two years of investment, RITTI has trained 1,242 teachers; together with the additional 1,138 teachers who participated in the summer of 1999, the program to date has directly engaged a quarter of the entire Rhode Island teacher population. The partnership between the Rhode Island Foundation, the Rhode Island Department of Education, and the University of Rhode Island is impressive. In bringing their collective resources, knowledge, and enthusiasm to bear on RITTI, these organizations demonstrate the potential and underscore the importance of shared vision and commitment.

A number of trends emerged over the first two years of RITTI which highlight the accomplishments of the program and suggest ways in which the initiative can be expanded upon and can deepen its impact. The program has succeeded in tapping into a committed and experienced group of educators who are demonstrating their willingness to rise to the challenge of making technology a core component of their professional repertoires. Although the majority of RITTI participants work at the elementary level, the initiative has drawn in educators across all grade levels and subject areas. RITTI has also been effective in addressing the needs of teachers with a broad range of instructional technology expertise. As a result of their participation in the summer training sessions, the majority of these educators report substantial increases in their ability to perform basic telecommunications tasks, such as sending email and conducting Internet searches. They also report dramatic improvements in their ability to make use of productivity and production applications such as word processors, presentation software, and web authoring tools.

Even more significantly, the data indicate that RITTI educators are assuming leadership roles in their own school communities. Not only do they perceive themselves as technologically knowledgeable, they are supporting their colleagues' use of technology, developing strategies for integrating technology into their schools' curricula, and making decisions about what hardware and software to purchase. Many of the RITTI participants are serving on school and district technology committees and are involved in making presentations about their technology work to school boards and other community organizations.

The fact that 95% of RITTI teachers are now using technology as a regular component of their daily routines indicates that the program has succeeded in one of its core mandates: enabling teachers to enhance their personal and professional productivity through the use of technology. RITTI has also been successful in allowing teachers to broaden their network of professional and collegial connections. RITTI educators report being more involved in conferences and spending more time working with other teachers on curriculum and instructional planning than was true in the past. While the data suggest that teachers' use of technology on a daily basis with students is constrained by a lack of access to computers at the classroom level, it is also clear that, despite this barrier, RITTI educators are finding ways to incorporate resources found on the Internet and on the RITTI listserv into their daily instructional practices.

Looking collectively at the Pilot and Program cohorts, there is little doubt that RITTI has succeeded in creating a technologically knowledgeable cadre of educators who are becoming advocates and leaders for the use of technology in their own school communities.

The analysis of responses across the different RITTI cohorts has enabled us to observe some important distinctions between the Pilot- and Program-year participants. Comparisons between Pilot responses at the end of their first and second years indicate that the ways in which these teachers are using technology for personal and professional reasons

is holding steady. Where interesting differences emerge is between the responses of the Pilot and Program cohorts. After one year of participation in the program the data reflect trends that characterize some important differences between these groups. In particular, after one year in RITTI the Pilot cohort is significantly more likely than the Program cohort to engage in a range of less traditional teaching and learning strategies. They are more likely, for example, to be teaching interdisciplinary units, to have their students working on long-term projects, and to take on the challenge of introducing new subject material to their students. As a cohort, Pilot participants appear to be more comfortable than their Program colleagues in allowing classroom practices to be more student-centered and student-directed. Many of these same trends remain true after the Pilot cohort's second year of RITTI participation. They continue to report in significantly higher percentages that they teach interdisciplinary units, that their students are engaged in long-term projects, and that their students learn effectively from peers. Pilot educators are also significantly more likely than Program teachers to say that computers are highly essential to their teaching.

What is notable about the data is the fact that these *differences between* the groups persist over the two years of the Pilot cohort's involvement in RITTI, while *within* the two sets of Pilot data we observe a "*holding steady*" pattern. These trends in the data suggest that certain differences characterize the cohorts themselves. It is possible to explain these trends by considering two phenomena. The first we term the "pioneering effect," which refers to Pilot educators and their Trainers strongly identifying themselves with a groundbreaking statewide effort. As educators involved in a new and highly publicized large-scale initiative, Pilot participants were frequently recognized for their willingness to take on the challenge of technology as well as to innovate and assume leadership roles in their own communities. The second phenomenon relates to the fact that Pilot participants represent a group of educators who were willing to take up the mantle of a new and untested initiative. There is a strong probability that these educators are the teachers in their communities who frequently rise to the challenge of innovation, whether with technology or otherwise. Therefore it is not surprising that we see a pattern of response among this cohort in which they more enthusiastically represent the perceived effects of the program on their teaching practices.

Regardless of these trends, it is important to underscore the overall impact that RITTI has had on both Pilot and Program educators. A quarter of the state's teachers now have a solid foundation in the use of technology as a core component of their instructional practices. The challenge for their local school communities is to build upon their knowledge and enthusiasm, and to cultivate the expertise gained through RITTI to advance and expand the use of technology so that it genuinely improves the quality of all students' learning.

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