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West Orange Collaborative

STARK Program

2002-2003 Evaluation Report

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EXECUTIVE SUMMARY

INTRODUCTION

This report summarizes the Year 2 evaluation study results of the Students and Teachers Accessing Real-time Knowledge (STARK) Program in the West Orange Consolidated Independent School District (CSID). The overall purpose of the evaluation was twofold: (a) to provide formative evaluation data to the participant schools to serve as a basis for improvement planning and as documentation of their accomplishments to demonstrate progress; and (b) to provide cumulative evidence of the implementation progress and outcomes of the participant schools as well as identification of exemplary programs**.**

The context for the evaluation consists of 10 schools receiving "Foundation" training developed by the Brazos-Sabine Connection and integration training provided by West Orange Collaborative. The Integration training places emphasis on employing technology in the classroom to support student-centered teaching methods that promote higher-level learning outcomes. It builds on Foundation training that deals directly with developing skills in using technology in the classroom.

The present 2002-2003 evaluation data were collected from 10 schools over the academic year. The data were compared to 2001-2002 baseline conditions to gauge program implementation progress.

RESEARCH QUESTIONS

The STARK Program evaluation was structured around six primary research questions that focused on classroom practices, degree and type of technology use, academically focused time, student engagement, student achievement, and school climate. Also of interest were teacher ability with, use of, and attitudes toward technology.

1. To what degree and how is technology integrated with classroom instruction by teachers in general and those who have received Foundation and/or integration training through the Enhanced Learning Academy?

2. To what degree do integration-trained teachers use methodologies that, consistent with STARK Program goals, stress higher-order learning and student-centered learning activities?

3. To what degree have teachers acquired the technology skills specified in the Texas state standards?

4. What are school outcomes in school climate and teacher uses of and attitudes toward technology? To what extent do these variables (a) reflect Foundation training and STARK Program goals, and (b) correlate with one another and with implementation success?

5. How are program activities being directed to increase student learning and specifically, to raising achievement on the Texas Essential Knowledge and Skills (TEKS)? (after Year 2)

6. What factors appear most instrumental in determining schools' success at achieving the goals and overall implementation of the STARK Program?

DESIGN

The evaluation design was based on both quantitative and qualitative data collected from classroom observations and teacher surveys. Participating schools were the 10 schools receiving "Foundation" training developed by the Brazos-Sabine Connection and integration training provided by West Orange Collaborative.

INSTRUMENTATION

Six instruments were used to collect the evaluation data: three classroom observation measures and three teacher surveys. The instruments used in the study are fully developed and validated. They are as follows:

Classroom Observation Measures

Observations were made focusing on targeted classes (scheduled visits) using three instruments.

- School Observation Measure (SOM)*: Examines frequency of usage of 24 instructional strategies.*
- Survey of Computer Use (SCU)*: Examines availability and student use of technology and software applications.*
- Rubric for Student-Centered Activities (RSCA)*: Rates the degree of learner engagement in cooperative learning, project-based learning, higher-level questioning, experiential/hands-on learning, student independent inquiry/research, student discussion, and students as producers of knowledge using technology.*

Surveys

- Teacher Technology Questionnaire (TTQ)*: Collects teacher perceptions of computers and technology.*
- School Climate Inventory (SCI)*: Assesses school staff perceptions of school climate on seven dimensions: Order, Leadership, Environment, Involvement, Instruction, Expectations, and Collaboration.*
- Technology Skills Assessment (TSA)*: Assesses the perceived technological abilities of the teachers in these areas: Computer Basics, Software Basics, Multimedia Basics, Internet Basics, Advanced Skills, Using Technology for Learning, and Policy and Ethics.*

PROCEDURE

Data for this evaluation study were collected in spring 2003. The SOM, SCU and RSCA were completed for the targeted observations. These consisted of prearranged one-hour sessions in which teachers who participated in the program's technology training demonstrated a prepared lesson using technology-notes forms were completed every 15 minutes of the lesson. A total of 52 classroom visits were completed. The teacher surveys (TTQ, SCI, and TSA) were administered in May 2003 during faculty meetings at each school.

RESULTS

Below is a brief summary of the results grouped by Classroom Observation Results and Survey Results.

Classroom Observation Results

The data for 52 classroom observations were collected with SOMs, SCUs, and RSCAs during prearranged sessions in which teachers implemented a lesson using technology. Results from each measure are described in the section below.

School Observation Measure (SOM©)

The SOM results revealed significant changes between baseline and Year 2 observations. These changes included using a greater variety of instructional strategies as well as using more student-centered practices. The largest differences were seen with regard to classroom use of technology. During Year 1, computer use was seen in only 30% or less of the observations, whereas Year 2 data revealed computer use in over 65% of the visits. The data suggest that the STARK program is having a positive impact on increasing teacher's use of student-centered learning techniques, integration of technology into instruction, and higher levels of academically focused class time and student attention.

Rubric for Student-Centered Activities (RSCA)

The results show that the RSCA strategies were observed in approximately one-third to one-half of the classroom observations – a slight increase (16%) from the baseline results. Also promising is the positive trend in the quality of strategy implementation – with all mean scores being above average. Although not significant, the mean scores for five of the seven RSCA strategies were higher – indicating continued growth toward teacher competency with non-traditional instructional strategies. The most striking RSCA result is the increased usage of technology to support student-centered activities.

Survey of Computer Use (SCU©)

The SCU results suggest that progress was made between Year 1 and Year 2 with regard to technology integration efforts. Specifically, students had more access to computers and digital tools; computer skills; and were more frequently using a variety of software tools. There were significant increases in student use of presentation software and use of the Internet, however, these and other software applications were still only seen in about 25% of the visits. The most striking result was the significant increase – indicating that teachers have increased their understanding and use of technology as a tool to enhance student learning.

Survey Results

Three surveys (SCI, TTQ, and TSA) were administered to the teachers during a faculty meeting held at each school in late May 2003. Results for the three instruments were examined for Year 1 vs. Year 2 differences. Data from the TTQ and TSA were also compared based on the amount of technology training received: no or partial training vs. full training. Results of the three surveys are presented below.

School Climate Inventory (SCI)

The moderate gain in SCI results suggests a positive trend in teacher attitudes about their school climate. This was particularly true for Involvement and Instruction, which were both significantly higher than the previous year. A slight decrease was seen for Order and Environment; however, the resulting means were still higher than the national norms. The data also suggest that schools may want to explore ways to increase student and parent-level involvement with educational issues. Overall SCI results once again reflect school environments that are generally open and supportive of reform initiatives focused toward improved educational opportunities.

Teacher Technology Questionnaire (TTQ)

The TTQ results for 2002-2003 show significant positive changes from the previous year in teacher perceptions of their readiness to integrate technology. This readiness is reflected in the high level of reported confidence with regard to teacher computer skills being adequate enough to conduct classes that have students use technology. There was also strong agreement that the teachers could readily obtain answers to technical problems and that school computers were kept in good working condition. However, approximately 50% of teachers were still less positive with regard to the impact of technology on their instruction. When examining the TTQ results by amount of technology training, two significant differences were revealed – both suggesting that the training had an educationally sound impact on teacher readiness to integrate technology and teacher belief that technology has a positive impact on classroom instruction.

Technology Skills Assessment

The TSA results revealed an overall increase in teacher confidence to complete a wide variety of computer-related tasks. The greatest level of confidence was with computer, software, Internet and multimedia basics. The teachers who had completed the technology training were significantly more confident with their ability to use technology as a learning tool.

CONCLUSIONS

The conclusions of the present study will be presented in association with each of the major research questions in the respective sections below.

To what degree and how is technology integrated with classroom instruction by teachers in general* and those who have received Foundation and/or integration training through the Enhanced Learning Academy?

Classroom observation data from both the SOM and SCU revealed significant differences in the degree and the way in which teachers integrate technology into their teaching. The most striking was a 40% increase in the use of computers as an instructional delivery tool and the 50% increase in student use of technology as a learning tool, which was seen in over 65% of the classroom observations. Another noteworthy increase in the use of computers is seen in data from the RSCA, which revealed that teachers integrated technology with approximately one third or more of their student-centered activities, as compared to less than 10% the previous year. Although students had more access to computers and digital tools, significant increases in the types of computer activities observed were only found for the use of Internet and presentation software. Word processing and educational software were the other two most frequently observed applications. Despite the limited scope of technology tools that were used to support classroom instruction, a dramatic improvement was seen in teacher ability to create and implement activities that meaningfully integrated the use of technology to enhance student learning. Specifically, meaningful (from somewhat to very meaningful) use of computers was only seen in 9.3% of the Year 1 observations as compared to 41.2% in Year 2. These results are highly suggestive that the STARK Program is effectively impacting technology integration efforts in the target schools.

*Note. The Year 2 classroom observations were once again conducted during pre-arranged visits to classrooms of teachers who had received technology training, therefore, the results reflect trained teachers rather than teachers in general. The Year 3 data will include all teachers.

To what degree do integration-trained teachers use methodologies that, consistent with STARK Program goals, stress higher-order learning and student-centered learning activities?

In over two-thirds of the classroom observations, teachers assumed the role of coaches or facilitators and technology was being used as a tool to support learning. Other activities that foster critical thinking and student engagement were seen in over 50% of the visits. These included experiential hands-on learning (57.7%), teacher provision of higher-level instructional feedback to students (55.8%), and teacher use of higher-level questioning strategies (53.8%). Although no significant increases were found when specifically examining the quality with which teachers implement student-centered activities, it is promising to note that all mean scores were above average – with five being higher than Year 1 ratings. The data indicate continued growth toward teacher competency with non-traditional instructional strategies. However, professional development efforts may want to increase the focus on better preparing teachers to implement these methods to increase the frequency with which they are utilized.

To what degree have teachers acquired the technology skills specified in the Texas State standards?

Impressive increases were seen in teacher confidence in all seven categories of technology skills. Nearly all (greater than 90%) of the teachers indicated that they could easily complete basic computer and software tasks and that they understood the policy and ethics of technology use. Seventy-five percent felt confident when using the Internet and over 60% reported that they could easily or very easily complete multimedia and/or advanced tasks, and use technology for learning. As would be expected, the teachers who had completed the technology training were significantly more confident with their ability to use technology as a learning tool – again an indication of successful teacher training through the STARK Program.

What are school outcomes in school climate and teacher uses of and attitudes toward technology? To what extent do these variables (a) reflect Foundation training and STARK Program goals, and (b) correlate with one another and with implementation success?

Results from the School Climate Inventory were again above national norms, suggesting that the environment of the 10 participating schools was supportive of school-wide initiatives such as technology integration. This positive climate was evidenced in the significant increases in frequency of classroom use of technology and teacher ability to create and implement meaningful computer activities. Positive teacher attitudes are also reflected in the TTQ results, which showed significantly higher teacher readiness to integrate technology and more confidence to conduct classes that have students use technology. A contributing factor to this increased confidence could perhaps be the increased level of computer literacy as reported on the TSA, plus the ready access to technical support provided by the schools and district. Significant differences were again revealed when examining results by the degree of training received – suggesting that the STARK Program had an educationally sound impact on teacher readiness to integrate technology and teacher belief that technology has a positive impact on classroom instruction. The overall results do suggest a positive trend in achieving the STARK Program goals and successful implementation, however the current efforts need to continue or increase to impact the approximately 50% of teachers who were still less positive with regard to the impact of technology on their instruction.

What factors appear most instrumental in determining schools' success at achieving the goals and overall implementation of the STARK Program?

Below is a list of key factors from the Year 2 study that appeared to have influenced the progress being made toward achievement of the STARK Program implementation and goals. As seen, the factors cross key elements that are critical for program success:

- Significant differences in instructional practices
- Significant differences in the quality of instructional practices
- Significant differences in school climate
- Significant differences in teacher attitudes and beliefs regarding technology integration
- Significant differences in teacher computer skills

Overall, the triangulation of positive changes suggests a strong synergy between the diverse factors that resulted in impressive progress toward achieving the STARK Program goals during the second year of implementation. As seen, the schools had positive climates, teacher technological competence increased, and classroom practices engaged students in meaningful technology-supported activities. These positive results suggest that program implementation for Year 3 should emulate Year 2, but with increased intensity to ensure all teachers are impacted.

STARK PROGRAM
EVALUATION REPORT

This report summarizes the 2002-2003 evaluation study results of the Students and Teachers Accessing Real-time Knowledge (STARK) Program in West Orange Consolidated Independent School District (CSID). The overall purpose of the evaluation was twofold: (a) to provide formative evaluation data to the participant schools to serve as a basis for improvement planning and as documentation of their accomplishments to demonstrate progress; and (b) to provide cumulative evidence of the implementation progress and outcomes of the participant schools as well as identification of exemplary programs.

The context for the evaluation consists of 10 schools receiving two levels of educational technology training. For the first level, teachers complete the online “Foundation” training modules developed by the Brazos-Sabine Connection. The second level involves teachers completing integration training provided during Saturday training sessions and an online University of Texas at Brownsville course developed by Karon Tarver of West Orange Collaborative. The Integration training places emphasis on employing technology in the classroom to support student-centered teaching methods that promote higher-level learning outcomes. It builds on Foundation training that deals directly with developing skills in using technology in the classroom.

The evaluation concentrated on the progress of the 10 schools in achieving STARK Program goals and raising student achievement. It is expected that the program will be implemented and monitored for multiple years. The present Year 2 evaluation examined progress over the 2002-2003 academic year. These data are compared to 2001-2002 baseline conditions to gauge program implementation progress. Suggestions for improvement are offered on the basis of the findings. Specific evaluation questions that guided the methodology, data collection, and reporting are listed in the next section.

RESEARCH QUESTIONS

The STARK Program evaluation was structured around six primary research questions that focused on classroom practices, degree and type of technology use, academically focused time, student engagement, student achievement and school climate. Also of interest were teacher ability with, use of, and attitudes toward technology. The detailed questions are listed below:

- To what degree and how is technology integrated with classroom instruction by teachers in general and those who have received Foundation and/or integration training through the Enhanced Learning Academy?
- To what degree do integration-trained teachers use methodologies that, consistent with STARK Program goals, stress higher-order learning and student-centered learning activities?
- To what degree have teachers acquired the technology skills specified in the Texas state standards?
- What are school outcomes in school climate and teacher uses of and attitudes toward technology? To what extent do these variables (a) reflect Foundation training and STARK Program goals, and (b) correlate with one another and with implementation success?
- How are program activities being directed to increase student learning and specifically, to raise achievement on the Texas Essential Knowledge and Skills (TEKS)? (after Year 2)
- What factors appear most instrumental in determining schools' success at achieving the goals and overall implementation of the STARK Program?

EVALUATION DESIGN AND MEASURES

The evaluation was conducted during the spring semester of the 2002-2003 academic year. The basic evaluation design for Year 2 reflected that of the Year 1 baseline study to enable two types of comparative analyses to be conducted: 1) Year 1 (baseline) vs. Year 2 and 2) no/partial vs. full technology training completed by teachers. Both quantitative and qualitative data were collected at each of the 10 schools by trained observers (e.g., retired teachers, district staff). The observers spent the major part of their time visiting classrooms (using three instruments to be described below), but also administered surveys to teachers, and monitored Benchmark development and use in assessing implementation progress. A description of the instruments and data collection procedures is presented below.

Instrumentation

Six instruments were used to collect the evaluation data: three classroom observation measures and three teacher surveys. The instruments used in the study are fully developed and validated. They are as follows:

Classroom Observation Measures

Trained observers conducted targeted classroom visits to collect frequency data regarding observed instructional practices. The visits were considered targeted because observations were scheduled in advance with randomly selected teachers (from those who participated in the program's technology training) who were instructed to deliver a lesson that integrates the use of technology. The data collection instruments were the School Observation Measure (SOM), the Survey of Computer Use (SCU), and the Rubric for Student-Centered Activities (RSCA[*]). The SOM was used to collect data regarding overall classroom activities, the SCU for student use of computers, and the RSCA to capture more detailed information about student-centered activities during the targeted observations. The classroom observation instruments are described below.

SOM. The SOM was developed to determine the extent to which different common and alternative teaching practices are used throughout an entire school (Ross, Smith, & Alberg, 1999). The standard, or *whole-school SOM*© procedure involves observers' visiting 10-12 randomly selected classrooms, for 15 minutes each, during a three-hour visitation period. The observer examines classroom events and activities descriptively, not judgmentally. Notes are taken relative to the use or nonuse of 24 target strategies. At the conclusion of the three-hour visit, the observer summarizes the frequency with which each of the strategies was observed across all classes in general on a data summary form. The frequency is recorded via a 5-point rubric that ranges from (0) Not Observed to (4) Extensively. Two global items use three-point scales (low, moderate, high) to rate, respectively, the use of academically-focused instructional time and degree of student attention and interest. *Targeted* observations were conducted to examine classroom instruction during prearranged one-hour sessions in which randomly selected teachers demonstrated a prepared lesson using technology. The notes forms were completed every 15 minutes of the lesson then were summarized on a SOM Data Summary Form.

[*] Expanded Rubric (ER) in Yr.1

To ensure the reliability of data, observers receive a manual providing definitions of terms, examples and explanations of the target strategies, and a description of procedures for completing the instrument. The target strategies include traditional practices (e.g., direct instruction and independent seatwork) and alternative, predominately student-centered methods associated with educational reforms (e.g., cooperative learning, project-based learning, inquiry, discussion, using technology as a learning tool). The strategies were identified through surveys and discussions involving policy makers, researchers, administrators, and teachers, as those most useful in providing indicators of schools' instructional philosophies and implementations of commonly used reform designs (Ross, Smith, Alberg, & Lowther, 2001).

After receiving the manual and instruction in a group session, each observer participates in sufficient practice exercises to ensure that his/her data are comparable with those of experienced observers. In a reliability study (Lewis, Ross, & Alberg, 1999), pairs of trained observers selected the identical overall response on the five-category rubric on 67% of the items and were within one category on 95% of the items. Further results establishing the reliability and validity of *SOM*© are provided in the Lewis et al. (1999) report.

<u>SCU</u>. A companion instrument to SOM is the Survey of Computer Use (SCU) (Lowther & Ross, 2001). The SCU was completed as part of the SOM observation sessions, where SCU data was also recorded in 15-minute intervals and then summarized on an overall data form.

The SCU was designed to capture exclusively *student* access to, ability with, and use of computers rather than teacher use of technology. Therefore, four primary types of data are recorded: (a) computer capacity and currency, (b) configuration, (c) student computer ability and (b) student activities while using computers. Computer capacity and currency is defined as the age and type of computers available for student use and whether or not Internet access is available. Configuration refers to the number of students working at each computer (e.g., alone, in pairs, in small groups). Student computer ability is assessed by recording the number of students who are computer literate (e.g., easily used software features/menus, saved or printed documents) and the number of students who easily use the keyboard to enter text or numerical information.

The next section of the *SCU* focuses on student use of computers with regard to: the types of activities, subject areas of activities, and software being used. The computer activities are divided into three categories based on the type of software tool: production tools, Internet/research tools, and educational software. Within each category, primary types of software are identified. For example, under Production Tools, the software includes: word processing, databases, spreadsheets, draw/paint/graphics, presentation (e.g., PowerPoint ™), authoring (e.g., KidPix ™), concept mapping (e.g., Inspiration), and planning (MS Project ™). For the Internet/research tools, three types of software are included: Internet browser, CD reference materials, and communications (e.g., email, listservs, chat rooms). The Educational Software also has three types of software: drill/practice/tutorial, problem-solving (e.g., Riverdeep ™) and process tools (e.g., Author's Toolkit ™). With this type of recording system, several activities can be noted during the observation of one student working on a computer. For example, if a student gathered data from the Internet, created a graph from the data, then imported the graph into a PowerPoint presentation, the observer would record three types of software tools as being observed: Internet browser, spreadsheet, and presentation. This section ends by identifying the subject area of each computer activity. The categories include: language arts, mathematics, science, social studies, other, and none. The computer activities and software being used are summarized and recorded using a five-point rubric that ranges from (0) Not Observed to (4) Extensively observed.

The final section of the SCU is an "Overall Rubric" designed to assess the degree to which the activity reflects "meaningful use" of computers *as a tool* to enhance learning. The rubric has four levels: 1 – Low-level use of computers, 2 – Somewhat meaningful, 3 – Meaningful, and 4 - Very meaningful.

RSCA. The Rubric for Student-Centered Activities was developed by CREP (Lowther, Ross, & Plants, 2000) as an extension to SOM and SCU. The RSCA was used by observers to more closely evaluate the degree of learner engagement in seven selected areas considered fundamental to the goals of increasing student-centered learning activities (cooperative learning, project-based learning, higher-level questioning, experiential/hands-on learning, student independent inquiry/research, student discussion, and students as producers of knowledge using technology). These strategies reflect emphasis on higher-order learning and attainment of deep understanding of content and whether or not technology was utilized as a component of the strategy. Such learning outcomes seem consistent with those likely to be engendered by well-designed, real-world linked exercises, projects, or problems utilizing technology as a learning tool. Each item includes a two-part rating scale. The first is a four-point scale, with 1 indicating a very low level of application, and 5 representing a high level of application. The second is a Yes/No option to the question: "Was technology used?" with space provided to write a brief description of the technology use. The RSCA was completed as part of SOM/SCU observation periods.

Teacher Surveys

Three surveys were used to collect impressions of the STARK Program: the School Climate Inventory (SCI), the Teacher Technology Questionnaire (TTQ), and the Technology Skills Assessment (TSA). Each of the seven participating schools administered the surveys at a faculty meeting conducted in May, 2002. The surveys are described below.

SCI. Researchers at the Center for Research in Educational Policy developed the School in 1989 (Butler & Alberg, 1991). The main purpose of the instrument is to assess impacts of reform initiatives in relation to seven dimensions logically and empirically linked with factors associated with effective school organizational climates. The inventory contains 49 items, with 7 items comprising each scale. Responses are scored through the use of Likert-type ratings ranging from strong disagreement (1) to strong agreement (5). Each scale yields scores ranging from 7 to 35, with higher scores being more positive. Additional items solicit basic demographic information on respondents.

Face validity of the school climate items and logical ordering of the items by scales were established during the development of the inventory (Butler & Alberg, 1991). Subsequent analysis of responses collected through administration of the inventory in a variety of school sites substantiated validity of the items. Scale descriptions and current internal reliability coefficients on the seven scales of the inventory, obtained using Cronbach's alpha are as follows:

School Climate Inventory Internal Reliability and Scale Descriptions

Scale	Internal Reliability	Description
Order	α=.8394	The extent to which the environment is ordered and appropriate student behaviors are present
Leadership	α=.8345	The extent to which the administration provides instructional leadership
Environment	α=.8094	The extent to which positive learning environments exist
Involvement	α=.7582	The extent to which parents and the community are involved in the school
Instruction	α=.7453	The extent to which the instructional program is well developed and implemented
Expectations	α=.7275	The extent to which students are expected to learn and be responsible
Collaboration	α=.7417	The extent to which the administration, faculty, and students cooperate and participate in problem solving

<u>TTQ</u>. The Teacher Technology Questionnaire is a three-part instrument used to collect teacher perceptions of computers and technology. In the first section, teachers rate their level of agreement with 20 statements regarding five technology-related areas: impact on classroom instruction, impact on students, teacher readiness to integrate technology, overall support for technology in the school, and technical support. Items are rated with a five-point Likert-type scale that ranges from (1) Strongly Disagree to (5) Strongly Agree. Two primary questions are asked in the second section. The first asks teachers to rate their level of computer ability as very good, good, moderate, poor, or no ability. Next, teachers indicate if they have a home computer, and if they do, if they use the home computer to access instructional materials on the Internet and/or to prepare classroom materials.

<u>TSA</u>. The Technology Skills Assessment (TSA) is a 57-item survey that includes 50 three-point Likert-type questions and 6 multiple-choice questions. The three-point questions are designed to assess the perceived technological abilities of the participants, while the multiple choice questions are designed to determine the actual knowledge of the participants on several areas of technological literacy. All of the questions are arranged into seven categories, which are aligned to the International Society for Technology in Education's (ISTE's) National Educational Technology Standards (NETS) and the Texas Essential Knowledge and Skills (TEKS) Technology Applications for Grades 3-5 (see Appendix A). The categories of the survey are as follows: Computer Basics, Software Basics, Multimedia Basics, Internet Basics, Advanced Skills, Using Technology for Learning, and Policy and Ethics. In the final section, participants are asked to identify the amount of training they have received through the Brazos-Sabine Foundation and through West Orange Collaborative integration program.

DATA COLLECTION

Table 1 provides the type of measures, instruments, number collected, administration timeline, and a brief data collection description for each of the instruments described in the previous section.

Table 1

Data Collection Summary

Type of Measure	Instrument	Number Collected	Timeline	Description
Classroom Observations	SOM SCU RSCA	52 52 52	Spring 2003	• Prearranged one-hour sessions in which teachers demonstrated a prepared lesson using technology -notes forms were completed every 15 minutes of the lesson.
Surveys	SCI TTQ TSA	276 243 286	May 2003	• Administered during a faculty meeting held during May 2003 at each of the 10 schools

RESULTS

Classroom Observation Results

The data for 52 classroom observations were collected with SOMs, SCUs, and RSCAs during prearranged sessions in which teachers implemented a lesson using technology. Results from each measure are described in the section below. This is followed with survey results.

School Observation Measure (SOM©)

As indicated in the description of SOM, the observation procedure primarily focused on 24 instructional strategies using a five-point rubric (0 = not observed, 1 = rarely, 2 = occasionally, 3 = frequently, and 4 = extensively). In an initial analysis, we computed the percentage of times a strategy was not observed (rubric category = 0) vs. observed (categories 1-4 combined). These results were then compared with the Year 1 baseline data. As shown in Table 2, direct instruction was the most frequently observed strategy for both years, however, there was a 10% decrease in its use during Year 2. The second most frequently observed strategy was teacher as a coach/facilitator, which was seen in nearly three-fourths of the observations (71.2%). This was a shift from baseline data in which use of higher-level instructional feedback (59.3%) was the second most prevalent strategy.

Chi-square analysis revealed a significant difference between Year 1 and Year 2 observations for approximately 30% (7 of 24) of the strategies. The most relevant were a 50% increase in the use of technology as a tool (16.8% vs. 65.4%) and a 40% increase in the use of computers for instructional delivery (29.6% vs. 67.3%). Other notable changes include a 30% increase in integration of subject areas (13.0% vs. 44.2%), and 20% increase in the use of higher level questioning strategies (33.4 vs. 53.8) and project-based learning (27.8% vs. 46.2%). The Year 2 data also revealed a significant increase in the use of systematic individual instruction (0.0% vs. 23.1%) and individual tutoring (11.3% vs. 32.7%).

Table 2

School Observation Measure (SOM) Proportion of not observed (0) vs. observed (1-4) strategies

Year 1 (2001-2002) N = 54
Year 2 (2002-2003) N = 52

Strategies	Not Observed		Observed	
	01-02	02-03	01-02	02-03
Direct instruction	13.0	19.2	87.1	78.8
Teacher as a coach/facilitator	40.7	25.0	57.5	71.2
Computer for instructional delivery***	68.5	30.8	29.7	67.3
Technology as a learning tool***	81.5	32.7	16.8	65.4
Experiential, hands on learning	57.4	42.3	42.6	57.7
Higher level instructional feedback	38.9	40.4	59.3	55.8
Use of higher-level questioning*	64.8	40.4	33.4	53.8
Independent seatwork	42.6	48.1	55.5	51.9
Project-based learning*	70.4	50.0	27.8	46.2
Integration of subject areas***	85.2	53.8	13.0	44.2
Ability groups	72.2	53.8	27.8	42.3
Student discussion	70.4	59.6	29.7	38.5
Cooperative/collaborative learning	72.2	59.6	27.9	36.5
Work centers	74.1	65.4	26.0	34.6
Individual tutoring**	85.2	61.5	11.3	32.7
Independent inquiry/research	88.9	75.0	11.2	25.0
Systematic individual instruction***	100.0	76.9	0.0	23.1
Multi-age grouping	81.5	78.8	18.5	21.2
Sustained writing/composition	85.2	78.8	14.9	19.2
Sustained reading	81.5	80.8	16.8	17.3
Team teaching	83.3	76.9	16.8	17.3
Performance assessment	81.5	84.6	14.9	13.5
Parent/community involvement	90.7	88.5	7.5	7.7
Student self-assessment	90.7	92.3	7.5	5.8

**p<.05, **p<.01, ***p<.001*
Note. Sorted from highest to lowest proportion of 2002-2003 Observed

Table 3 presents the full, five-category breakdown of the Year 1 and Year 2 SOM results. When examining the strategies that were viewed frequently or extensively in at least 30% of the observations, Year 1 data only revealed four activities while Year 2 data revealed 10 activities. Of those ten, the following four were observed in over 50% of the visits: direct instruction (69.3%), teacher acting as a coach/facilitator (57.7%), computer for instructional delivery (53.9%), and technology as a learning tool (52.0%). The six remaining strategies were as follows: experiential hands-on learning (48.1%), ability groups (42.3%), project-based learning (40.4%), higher-level questioning strategies (38.5%), independent seatwork (38.5%), and higher-level instructional feedback (36.6%).

Table 3

School Observation Measure (SOM) Data Summary

Year 1 (2001-2002) N = 54
Year 2 (2002-2003) N = 52

The extent to which each of the following was used or present in the classroom.	Year	Percent None	Percent Rarely	Percent Occasionally	Percent Frequently	Percent Extensively
Instructional Orientation						
Direct instruction (lecture)	01-02	13.0	16.7	22.2	9.3	38.9
	02-03	19.2	3.8	5.8	38.5	30.8
Team teaching	01-02	83.3	1.9	1.9	1.9	11.1
	02-03	76.9	0.0	1.9	9.6	5.8
Cooperative/collaborative learning	01-02	72.2	1.9	5.6	11.1	9.3
	02-03	59.6	1.9	7.7	11.5	15.4
Individual tutoring (teacher, peer, aide, adult volunteer)	01-02	85.2	5.6	1.9	1.9	1.9
	02-03	61.5	7.7	9.6	11.5	3.8
Classroom Organization						
Ability groups	01-02	72.2	0.0	0.0	1.9	25.9
	02-03	53.8	0.0	0.0	1.9	40.4
Multi-age grouping	01-02	81.5	0.0	0.0	0.0	18.5
	02-03	78.8	0.0	0.0	0.0	21.2
Work centers (for individuals or groups)	01-02	74.1	1.9	0.0	3.7	20.4
	02-03	65.4	1.9	3.8	11.5	17.3
Instructional Strategies						
Higher level instructional feedback (written or verbal) to enhance student learning	01-02	38.9	25.9	13.0	13.0	7.4
	02-03	40.4	7.7	11.5	23.1	13.5
Integration of subject areas (interdisciplinary/thematic units)	01-02	85.2	3.7	1.9	3.7	3.7
	02-03	53.8	11.5	7.7	13.5	11.5
Project-based learning	01-02	70.4	0.0	3.7	1.9	22.2
	02-03	50.0	0.0	5.8	9.6	30.8
Use of higher-level questioning strategies	01-02	64.8	11.1	9.3	9.3	3.7
	02-03	40.4	5.8	9.6	23.1	15.4
Teacher acting as a coach/facilitator	01-02	40.7	9.3	5.6	25.9	16.7
	02-03	25.0	5.8	7.7	34.6	23.1
Parent/community involvement in learning activities	01-02	90.7	0.0	0.0	1.9	5.6
	02-03	88.5	1.9	1.9	0.0	3.8
Student Activities						
Independent seatwork (self-paced worksheets, individual assignments)	01-02	42.6	11.1	14.8	11.1	18.5
	02-03	48.1	1.9	11.5	21.2	17.3
Experiential, hands-on learning	01-02	57.4	3.7	3.7	9.3	25.9
	02-03	42.3	1.9	7.7	23.1	25.0

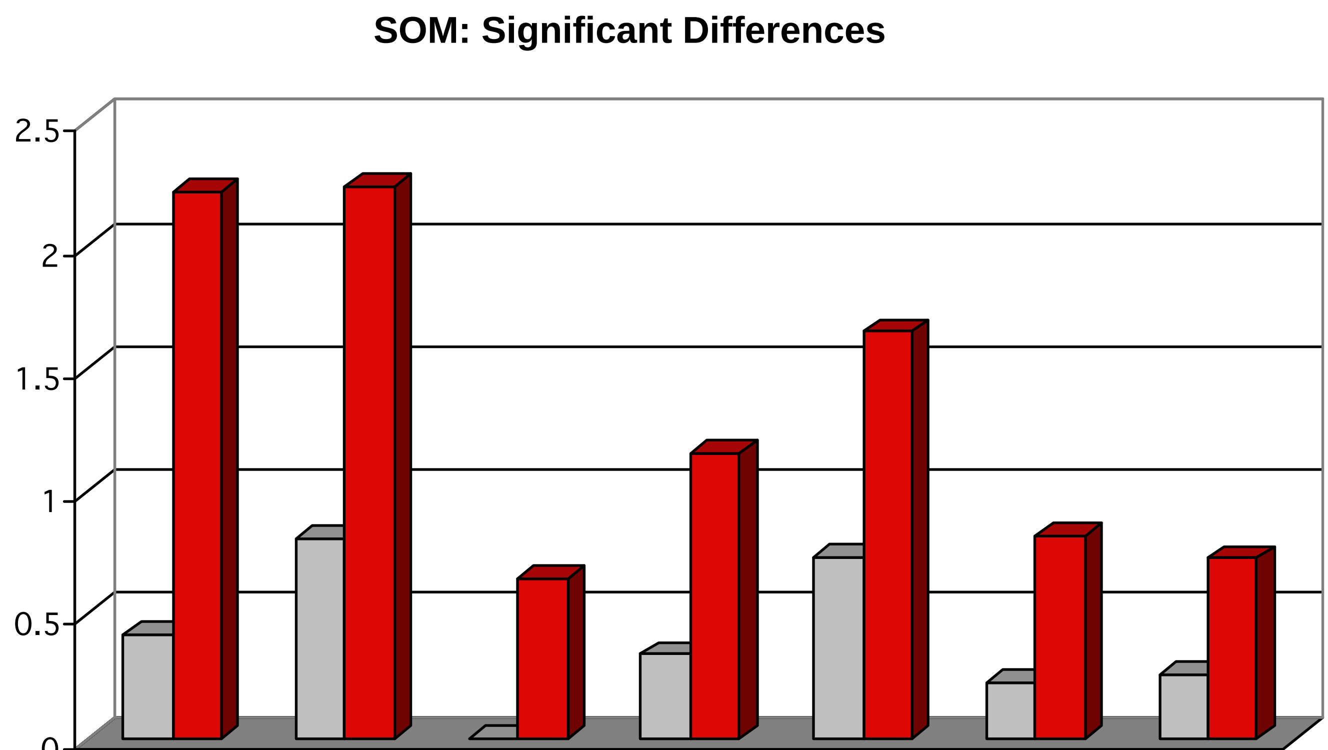
Table 3 - continued

	Year	Percent None	Percent Rarely	Percent Occasionally	Percent Frequently	Percent Extensively
Student Activities (continued)						
Systematic individual instruction (differential assignments geared to individual needs)	01-02	100.0	0.0	0.0	0.0	0.0
	02-03	76.9	3.8	3.8	7.7	7.7
Sustained writing/composition (self-selected or teacher-generated topics)	01-02	85.2	1.9	3.7	5.6	3.7
	02-03	78.8	0.0	3.8	3.8	11.5
Sustained reading	01-02	81.5	5.6	5.6	5.6	0.0
	02-03	80.0	0.0	5.8	3.8	7.7
Independent inquiry/research on the part of students	01-02	88.9	5.6	0.0	1.9	3.7
	02-03	75.0	1.9	5.8	9.6	7.7
Student discussion	01-02	70.4	5.6	9.3	11.1	3.7
	02-03	59.6	5.8	9.6	23.1	0.0
Technology Use						
Computer for instructional delivery (e.g. CAI, drill & practice)	01-02	68.5	3.7	11.1	5.6	9.3
	02-03	30.8	1.9	11.5	21.2	32.7
Technology as a learning tool or resource (e.g. Internet research, spreadsheet or database creation, multi-media, CD ROM, Laser disk)	01-02	81.5	5.6	3.7	1.9	5.6
	02-03	32.7	3.8	9.6	13.5	38.5
Assessment						
Performance assessment strategies	01-02	81.5	0.0	7.4	1.9	5.6
	02-03	84.6	0.0	5.8	3.8	3.8
Student self-assessment (portfolios, individual record books)	01-02	90.7	1.9	1.9	0.0	3.7
	02-03	92.3	0.0	3.8	0.0	1.9
Summary Items				Low	Moderate	High
Academically focused class time	01-02			0.0	29.6	64.8
	02-03			3.8	7.7	76.9
Level of student attention/ interest/engagement	01-02			1.9	35.2	59.3
	02-03			3.8	15.4	69.2

Upon examination of the final section of SOM, the data indicate at least a 10% increase in the percent of visits in which there was a high level of academically focused time (Yr. 1 = 64.8%; Yr. 2 = 76.9%). Similar results were seen in the level of student attention, interest, and/or engagement, which was rated as high in almost 70% as compared to 60% of the baseline observations (Yr. 1 = 59.3%; Yr. 2 = 69.2%).

Inferential results: Year 1 vs. Year 2. To determine whether significant changes occurred between Year 1 and Year 2, t-tests for independent samples were performed on each item. We also computed Effect Sizes (*ES*) using Cohen's *d* formula (Cohen, 1988) to determine the educational importance of differences (an *ES* having an absolute value greater than .25 is considered to be educationally important). As shown in Figure 1 and Table 4, there were significant differences on seven items, with all strategies showing higher frequency of observation in Year 2. In addition, the Effect Size for the seven items ranged from 1.24 to 0.42. The two items revealing the greatest difference were technology as a learning tool (*M* = 2.22) and computer for instructional delivery (*M* = 2.24) – both target strategies of the STARK Program. Also noteworthy, five of the seven significant items are supportive of student-centered learning in a technology-supported environment (technology as a learning tool, integration of subject areas, use of higher-level questioning strategies, independent inquiry/research on the part of students, and systematic individual instruction).

Figure 1



	Technology as tool (ES = 1.24)	Computer for delivery (ES = .93)	Systematic indiv instr (ES = .71)	Integration of subject areas (ES = .65)	Use of higher-level questions (ES = .65)	Individual tutoring (ES = .57)	Independent inquiry (ES = .42)
2001-2002	0.42	0.81	0	0.34	0.74	0.23	0.26
2002-2003	2.22	2.24	0.65	1.16	1.65	0.82	0.73

Scale: 0 = Not Observed; 4 = Extensively Observed

Table 4

A Summary of SOM Items Showing Significant Differences Between 2001-2002 and 2002-2003

	2001-2002 (n = 54)		2002-2003 (*n* = 52)				
SOM Items	**M**	**SD**	**M**	**SD**	***t (102)***	***p***	***ES***
Technology as learning tool or resource	0.42	1.06	2.22	1.76	6.29	0.000***	+1.24
Computer for instructional delivery	0.81	1.37	2.24	1.68	4.72	0.000***	+0.93
Systematic individual instruction	0.00	0.00	0.65	1.31	3.59	0.001***	+0.71
Integration of subject areas	0.34	0.98	1.16	1.50	3.27	0.002**	+0.65
Use of higher-level questioning strategies	0.74	1.20	1.65	1.61	3.24	0.002**	+0.65
Individual tutoring	0.23	0.76	0.82	1.26	2.79	0.007**	+0.57
Independent inquiry/research on the part of students	0.26	0.87	0.73	1.35	2.12	0.037*	+0.42

**p<.05, **p<.01, ***p<.001*

Summary. The SOM results revealed significant changes between baseline and Year 2 observations. These changes included using a greater variety of instructional strategies as well as using more student-centered practices. The largest differences were seen with regard to classroom use of technology. During Year 1, computer use was seen in only 30% or less of the observations, whereas Year 2 data revealed computer use in over 65% of the visits. The data suggest that the STARK program is having a positive impact on increasing teacher's use of student-centered learning techniques, integration of technology into instruction, and higher levels of academically focused class time and student attention.

Rubric for Student-Centered Activities (RSCA)

Results address the percentage of sessions in which each RSCA strategy was observed at least once, the quality/depth of observed strategy applications, and the percentage of sessions in which technology was used with the observed strategy. Because the RSCA was used in targeted observations of lessons that were to include the use of technology to support learning, computer use was expected to be viewed at sometime during the lesson.

Observed vs. not observed. The first question on each RSCA item asked whether or not the particular strategy was observed. As can be seen in Table 5, all strategies were observed more frequently during Year 2 as compared to Year 1. The most frequently observed strategy during the baseline was higher-level questioning (53.7%), followed by experiential hands-on learning (38.9%). These results were reversed for Year 2 in that experiential hands-on learning was the most frequently observed (58.5%) and higher level questioning followed at 56.6%. Independent inquiry was the least observed strategy for Year 1 and Year 2, however, its use increased from 16.6% during Year 1 to 35.9% during Year 2.

Ratings. The next set of analyses examined the rubric rating (1 to 4) for each of the strategies, when the given strategy was observed. That is, if the strategy was not seen, the associated rating of "0" was excluded from the analysis because it would seriously negatively bias the overall computation of quality/effectiveness. A descriptive summary of the Year 1 and Year 2 means are also presented in Table 5. As shown, the Year 2 mean scores range between approximately 2.40 and 3.06 suggesting moderate to moderately high levels of quality/effectiveness. The experiential, hands-on learning activities, or those that involved extensive and effective use of manipulatives or hands-on experiences and project-based learning were assessed as being the most meaningful (M = 3.06, M = 3.04, respectively). Also noteworthy was a moderate increase for students as producers of knowledge mean score (Yr. 1 M = 1.85; Yr. 2 M = 2.65) and percent of times this strategy was observed (Yr. 1 = 24.1%; Yr. 2 = 43.4%). This suggests a positive trend toward more meaningful and frequent student use of computers as productivity tools. On a less positive note, two items received lower ratings during the Year 2 observations: cooperative learning (Yr. 1 M = 2.75; Yr. 2 M = 2.40) and experiential hands-on learning (Yr. 1 M = 3.29; Yr. 2 M = 3.06). Although the mean scores are above average and the differences were not significant, it may be worthwhile to monitor these areas during the next year of implementation.

Inferential results: Year 1 vs. Year 2. Inferential analyses (t test for independent samples) were conducted to compare Year 1 to Year 2 rubric ratings. No significant differences were revealed.

Table 5

Rubric for Student Centered Activities Item Ratings by Percentage Observed and Mean Scores

Year 1 (2001-2002) N = 52
Year 2 (2002-2003) N = 54

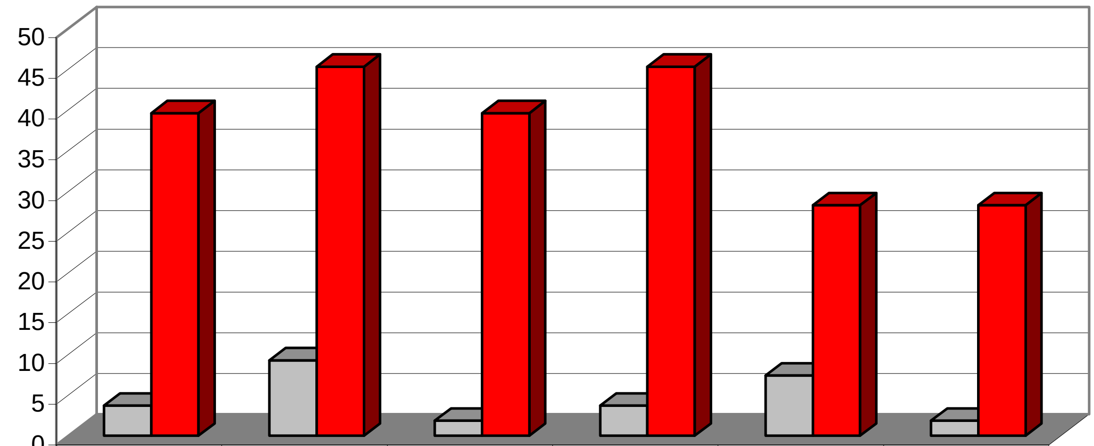
Items	Year	% Observed	Rubric Rating* - Percentage Observed				Mean*
			1	2	3	4	
Cooperative Learning	01-02	29.6	1.9	11.1	9.3	7.4	2.75
	02-03	47.1	15.1	11.3	7.5	13.2	2.40
Project-Based Learning	01-02	27.8	3.7	5.6	5.6	13.0	3.00
	02-03	47.2	1.9	13.2	13.2	18.9	3.04
Higher-Level Questioning Strategies	01-02	53.7	18.5	14.8	9.3	7.4	2.11
	02-03	56.6	11.3	17.0	13.2	15.1	2.57
Experiential, Hands-On Learning	01-02	38.9	1.9	9.3	3.7	24.1	3.29
	02-03	58.5	3.8	13.2	17.0	24.5	3.06
Independent Inquiry / Research	01-02	16.7	7.4	0.0	1.9	7.4	2.56
	02-03	35.9	13.2	3.8	3.8	15.1	2.58
Student Discussion	01-02	33.3	18.5	0.0	5.6	9.3	2.17
	02-03	45.2	9.4	7.5	20.8	7.5	2.58
Students as Producers of Knowledge	01-02	24.1	16.7	0.0	1.9	5.6	1.85
	02-03	43.4	7.5	15.1	5.7	15.1	2.65

**Rating scale: 1 = limited application; 4 = Strong application.*

Technology use. As can be seen in Figure 2, technology was used to support RSCA strategies to a greater extent this year as compared to last year. In nearly 50% of the observations, technology was used to support students engaged in project-based learning (45.3%) and experiential hands-on learning activities. Teachers also used technology to support cooperative learning and higher level questioning during 40% of the observations. Technology was used less frequently in conjunction with independent inquiry and student discussion as these uses were only observed in 30% of the visits. The lower occurrence of technology during student discussion is not surprising since this activity often occurs as face-to-face rather than online interactions.

Figure 2

Percent of RSCA Activities that Used Technology



	Cooperative Learning	Project-based Learning	Higher-Level Questions	Hands-on Learning	Independent inquiry	Student Discussion
Year 1	3.7	9.26	1.85	3.7	7.41	1.85
Year 2	39.6	45.3	39.6	45.3	28.3	28.3

*Students as Producers of Knowledge is not included because use of technology is a required component.

Summary. The results show that the RSCA strategies were observed in approximately one-third to one-half of the classroom observations – a slight increase (16%) from the baseline results. Also promising is the positive trend in the quality of strategy implementation – with all mean scores being above average. Although not significant, the mean scores for five of the seven RSCA strategies were higher – indicating continued growth toward teacher competency with non-traditional instructional strategies. The most striking RSCA result is the increased usage of technology to support student-centered activities.

Survey of Computer Use (SCU)

As with the SOM and RSCA, data from the SCU were collected during prescheduled lessons in which teachers were asked to use technology. A summary of the observation results for Year 1 and Year 2 is provided in Table 6. Data for the 2001-2002 Computer Configuration, Testing Software, and Computers/Digital Tools Used by Students are not listed in the table as the reporting format changed from Year 1 to Year 2. Relevant data from these categories will be discussed in the narrative.

Table 6

Survey of Computer Use (SCU) Data Summary

Year 1 (2001-2002) N = 54
Year 2 (2002-2003) N = 51

Computer Configuration	**2001-2002**	**2002-2003**
Classrooms most frequently had the following number of computers or digital tools.		
None	.	2.0
One	.	17.6
2 - 4	.	51.0
5 – 10	.	5.9
11 or more	.	23.5
Classroom computers were most frequently		
Up-to-date	.	64.7
Aging, but adequate	.	29.4
Outdated/limited capacity	.	2.0
No computers were observed	.	2.0
Classroom computers were most frequently		
Connected to the Internet	.	84.3
Not connected to the Internet	.	13.7
No computers were observed	.	2.0
Student Computer Use		
Classroom Computers or digital tools were most frequently used by:		
Few (less than 10%) students	.	27.5
Some (about 10-50%) students	.	13.7
Most (about 51-90%) students	.	2.0
Nearly all (91-100%) students	.	35.3
Students did not use computers	.	17.6
Students most frequently worked with computers or digital tools:		
Alone	.	45.1
In pairs	.	7.8
In small groups	.	15.7
Students did not use computers	.	27.5
Student computer literacy skills were most frequently:		
Poor	.	7.8
Moderate	.	27.5
Very good	.	19.6
Not observed	.	41.2
Student keyboarding skills were most frequently:		
Poor	.	9.8
Moderate	.	5.9
Very good	.	25.5
Not observed	.	54.9

Note. Results marked as "." are not listed as they were reported in a different format or not collected in 2001-2002.

Computers/Digital Tools Used by Students (2002-2003 only)	**Year**	**Not Observed**	**Rarely**	**Occasionally**	**Frequently**	**Extensively**
Desktop Computers	*2002-2003*	47.1	2.0	5.9	11.8	25.5
Laptop Computers	*2002-2003*	52.9	7.8	9.8	9.8	13.7
Personal Data Assistants (PDA)	*2002-2003*	88.2	0.0	0.0	0.0	2.0
Graphing Calculator	*2002-2003*	88.2	0.0	0.0	0.0	2.0
Information Processor (e.g., Alphaboard)	*2002-2003*	90.2	0.0	0.0	0.0	0.0
Digital Accessories (e.g., camera, scanner, probes)	*2002-2003*	78.4	0.0	5.9	0.0	5.9

*Note: Item percentages may not total 100% because of missing input from some respondents.

Table 6 continued

Student Computer Activities by Software Used	Year	Not Observed	Rarely	Occasionally	Frequently	Extensively
Production Tools						
Word Processing	2001-2002	88.9	0.0	5.6	1.9	3.7
	2002-2003	76.5	3.9	3.9	0.0	11.8
Database	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	100.0	0.0	0.0	0.0	0.0
Spreadsheet	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	90.2	0.0	0.0	2.0	3.9
Draw/Paint/Graphics	2001-2002	98.1	1.9	0.0	0.0	0.0
	2002-2003	80.4	3.9	2.0	2.0	5.9
Presentation (e.g., MS PowerPoint)**	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	74.5	2.0	0.0	5.9	9.8
Authoring (e.g., HyperStudio)	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	100.0	0.0	0.0	0.0	0.0
Concept Mapping (e.g., Inspiration)	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	90.2	0.0	0.0	0.0	3.9
Planning (e.g., MS Project)	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	90.2	0.0	0.0	2.0	0.0
Internet/Research Tools						
Internet Browser (e.g., Netscape)**	2001-2002	92.6	7.4	0.0	0.0	0.0
	2002-2003	74.5	0.0	2.0	3.9	11.8
CD Reference (encyclopedias, etc.)	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	86.3	0.0	0.0	3.9	0.0
Communications	2001-2002	100.0	0.0	0.0	0.0	0.0
	2002-2003	100.0	0.0	0.0	0.0	0.0
Educational Software						
Drill/Practice/Tutorial	2001-2002	83.3	3.7	1.9	0.0	11.1
	2002-2003	78.4	0.0	2.0	5.9	9.8
Problem Solving (e.g., SimCity)	2001-2002	98.1	0.0	0.0	0.0	0.0
	2002-2003	90.2	0.0	0.0	0.0	2.0
Process Tools (Geometer's Sketchpad, etc.)	2001-2002	94.4	0.0	0.0	0.0	3.7
	2002-2003	90.2	0.0	0.0	2.0	2.0
Testing Software						
Individualized/Tracked (e.g., Accelerated Reader)	2001-2002	.	.	.	.	.
	2002-2003	88.2	0.0	0.0	0.0	0.0
Generic	2001-2002	.	.	.	.	.
	2002-2003	86.3	0.0	0.0	0.0	0.0

$^{**}p<.01$

Subject Areas of Computer Activities	Year	None	Other	Language	Mathematics	Science	S. Studies
Production Tools	2001-2002	90.7	5.6	1.9	0.0	0.0	1.9
	2002-2003	27.5	11.8	37.3	11.8	7.8	13.7
Internet/Research Tools	2001-2002	88.9	7.4	1.9	0.0	1.9	0.0
	2002-2003	52.9	3.9	17.6	5.9	3.9	5.9
Educational Software	2001-2002	79.6	5.6	1.9	11.1	5.6	1.9
	2002-2003	52.9	5.9	21.6	9.8	5.9	0.0
Testing Software	2001-2002	.	.	.	.	.	.
	2002-2003	68.6	3.9	5.9	2.0	2.0	2.0

Notes. 1) Results marked as "." are not listed as they were reported in a different format or not collected in 2001-2002.
2) Item percentages may not total 100% because of missing data.

Computer Configuration. There was a dramatic increase in the number of classroom computers between Year 1 and Year 2. Last year, the majority (60%) of the classrooms had only one computer, whereas this year, approximately 80% of the classrooms had two or more computers. Of those computers, most (65%) were considered to be well equipped and up to date. Since Year 1 connectivity of classroom computers to the Internet was fairly high (83.3%), there was very little change in the Year 2 percent of classroom computers reported as being connected to the Internet (84.3%). When looking at the types of technology that were in use, desktop and laptop computers were the most prevalent as they were seen in approximately 50% of the visits (52.9%, 47.1% respectively). There was a moderate increase in the percent of visits in which students displayed a high level of computer literacy skills (Year 1 = 11.2%; Year 2 = 19.6%) and keyboarding skills (Year 1 = 14.9%; Year 2 = 25.5%).

Student Computer Activities by Software used. The Year 2 as compared to Year 1 SCU data show a greater variety of software applications being used by the students. During Year 1, only 6 of the 14 (without Testing software) listed software tools were seen in use, whereas all but two (database and authoring) were observed to some degree during the Year 2 classroom visits. Brief descriptions of the different software uses, related subject area content of the activities, and noted significant differences derived from chi-square tests of independence are presented below.

Production tools used by students. As shown in Table 6, the Year 2 observations show students using each type of production tool (except databases and authoring) in approximately 10% to 25% of the visits. The most frequently observed software use was for presentation and word processing applications, which were seen in approximately 25% of the visits. Presentation software was the only production tool used significantly more during Year 2 as compared to Year 1 ($p < .01$). However, the extent of use was limited in that it was frequently or extensively seen in less than 16% of the classroom observations. With regard to the subject area focus, the majority of production tool activities were in language arts (37.3%). Fewer production tool activities involved social studies (13.7%), mathematics (11.8%), other non-core subject areas (11.8%), and science (7.8%).

Internet/research tools used by students. There was a significant Year 1 to Year 2 increase in the percent of observations in which students were using the Internet ($p < .01$) and a slight increase in student use of CD references. The research activities covered all subject areas, however, the majority were focused on language arts (17.6%). The remainder of the subject areas were seen in only approximately 4% to 6% of the visits.

Educational software use by students. The use of educational software increased from Year 1 to Year 2, however, the change was non-significant. As with production and Internet/research tools, the educational software activities were typically focused on language arts (21.6%). Mathematics software was observed in approximately10% (9.8%) of the visits, while science and other subject area software was seen in only 5.9% of the observations.

Testing software use by students. Testing software was a new addition to the SCU for Year 2 data collection to capture student use of programs such as Accelerated Reader®, therefore Year 1 data are not reported. As seen, testing software was not observed during the classroom visits.

Overall Meaningful Use of Computers. The culminating assessment on the SCU was the observer's evaluation of the meaningfulness of the way in which technology was integrated with teaching and learning. To do this, they were asked to indicate how often they observed computer activities at each level of the rubric; e.g., how often was *very meaningful* use of computers observed. As can be seen in Figure 3 and Table 7, significant differences between Year 1 and Year 2 observations were found on all four levels of the rating scale. The direction of the data shows progression toward more meaningful applications during Year 2. For example, "very meaningful use" was at least occasionally observed in 15.7% of the Year 2 visits but in only 3.7% of the Year 1 visits ($p < .05$). Likewise, "meaningful" usage was observed occasionally or more in 41.2% of the Year 2 visits as compared to only 3.8% in Year 1 ($p < .001$).

Figure 3

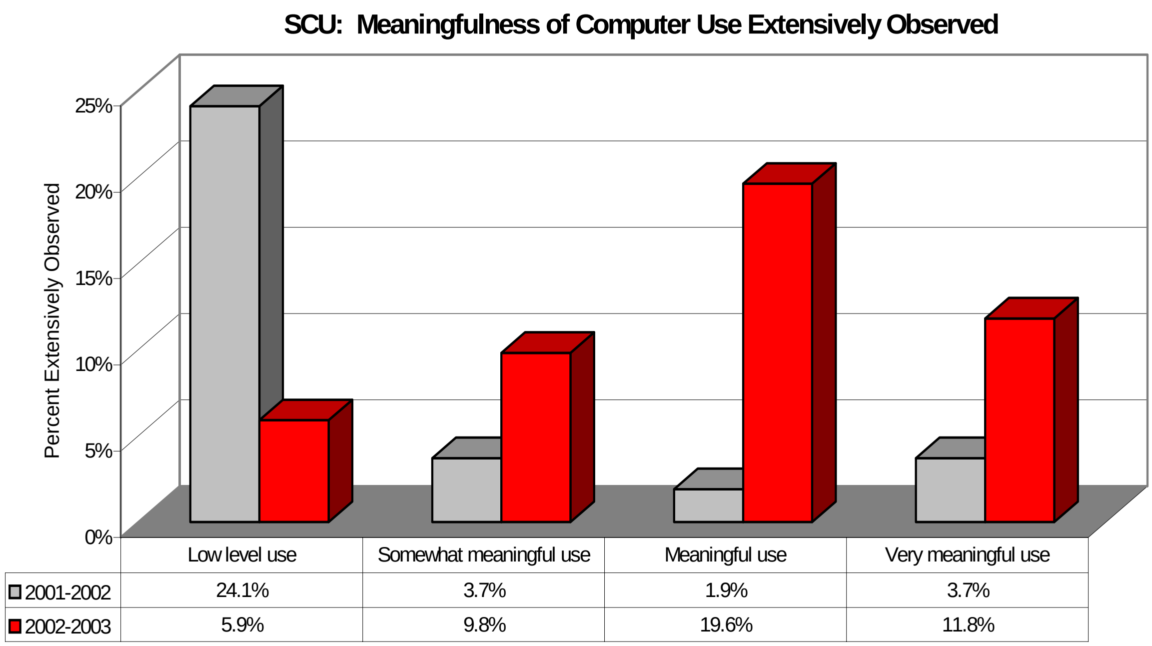


Table 7

SCU: Overall Meaningfulness of Computer Activities

Year 1 (2001-2002) N = 54
Year 2 (2002-2003) N = 51

Overall meaningful use of computers	Year	Not Observed	Rarely	Occasionally	Frequently	Extensively
Low level use of computers*	*2001-2002*	74.1	1.9	0.0	0.0	24.1
	2002-2003	68.6	3.9	3.9	3.9	5.9
Somewhat meaningful use of computers*	*2001-2002*	81.5	7.4	3.7	0.0	3.7
	2002-2003	54.9	7.8	5.9	9.8	9.8
Meaningful use of computers***	*2001-2002*	94.4	0.0	1.9	0.0	1.9
	2002-2003	45.1	2.0	11.8	9.8	19.6
Very meaningful use of computers*	*2001-2002*	94.4	0.0	0.0	0.0	3.7
	2002-2003	66.7	3.9	3.9	0.0	11.8

**p<.05, **p<.01, ***p<.001*

Summary. The SCU results suggest that progress was made between year 1 and Year 2 with regard to technology integration efforts. Specifically, students had more access to computers and digital tools; computer skills; and were more frequently using a variety of software tools. There were significant increases in student use of presentation software and use of the Internet, however, these and other software applications were still only seen in about 25% of the visits. The most striking result was the significant increase – indicating that teachers have increased their understanding and to use technology as a tool to enhance student learning.

SURVEY RESULTS

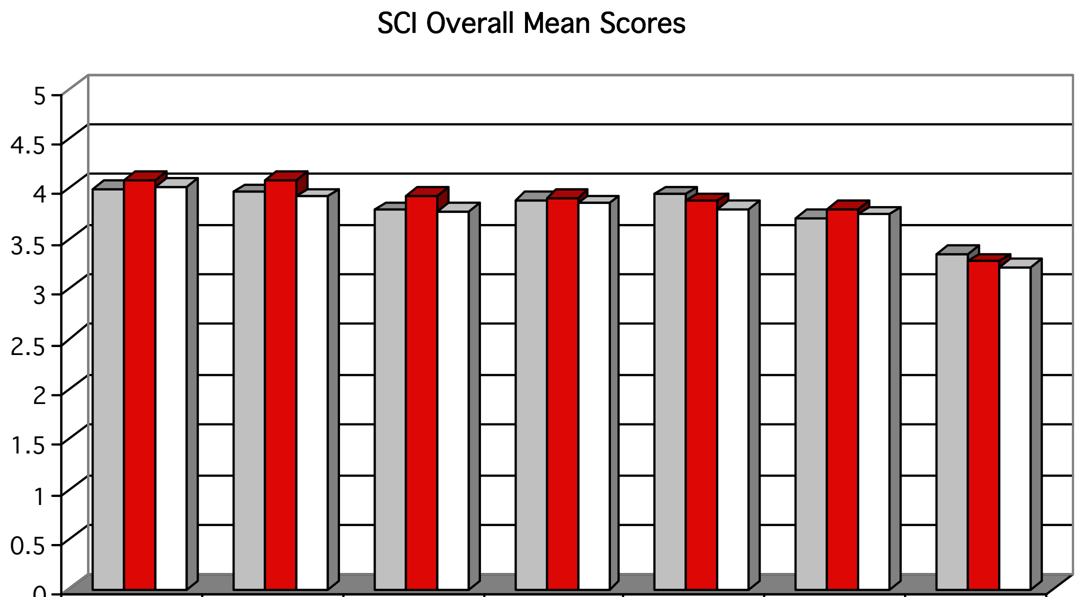
Three surveys (SCI, TTQ, and TSA) were administered to the teachers during a faculty meeting held at each school in late May 2003. Results for the three instruments were examined for Year 1 vs. Year 2 differences. Data from the TTQ and TSA were also compared based on the amount of technology training received: no or partial training vs. full training. Results of the three surveys are presented below.

School Climate Inventory (SCI)

Teacher responses to the SCI were fairly positive across Year 1 and Year 2, although there was a slight Year 2 increase in five of the seven overall dimension mean scores and the overall mean (see Figure 4 and Table 8). The Year 2 means were also slightly higher than all the national norms as compared to 5 of the seven Year 1 means. The following items on the Year 2 SCI received nearly unanimous agreement from the teachers: “parents are always treated courteously when they call or visit the school” (96.7%), “low achieving students are given opportunity for success in the schools” (94.6%), and “teachers use a variety of teaching strategies or models” (94.2%). The items with the lowest level of teacher agreement were “students participate in solving the problems of the school” (29.3%) and “parents are involved in a home and school support network” (41.3%)

Inferential Analysis. To determine if significant differences existed between Year 1 and 2, a MANOVA was conducted to compare the two sets of data. Table 9 presents a summary of the results that depict a significant multivariate effect, $F(7, 427) = 6.40$, $p < .000$. Follow-up analyses of univariate effects revealed significant differences on two of the seven dimensions: Involvement (Year 1 $M = 3.78$; Year 2 $M = 3.93$) and Instruction (Year 1 $M = 3.99$; Year 2 $M = 4.08$). However, upon examination of the resulting Effect Sizes of the differences, the implied educational impact is moderately high for Involvement ($ES = +0.28$), and limited with regard to Instruction ($ES = +0.21$).

Figure 4



	Instruction	Leadership	Involvement	Expectations	Environment	Collaboration	Order
Year 1	3.99	3.96	3.78	3.88	3.94	3.71	3.35
Year 2	4.08	4.08	3.93	3.90	3.87	3.79	3.27
National Norm	4.02	3.92	3.77	3.85	3.79	3.74	3.22

**Sorted from highest to lowest Year 2 Mean Scores*

Summary. The moderate gain in SCI results suggests a positive trend in teacher attitudes about their school climate. This was particularly true for Involvement and Instruction, which were both significantly higher than the previous year. A slight decrease was seen for Order and Environment; however, the resulting means were still higher than the national norms. The data also suggest that schools may want to explore ways to increase student and parent-level involvement with educational issues. Overall SCI results once again reflect school environments that are generally open and supportive of reform initiatives focused toward improved educational opportunities.

Table 8

School Climate Inventory Results

Year 1 (2001-2002) N = 297
Year 2 (2002-2003) N = 276

Section 1 **SCI Items by Scale: Percent Strongly Agree and Agree**	**% Strongly Agree and Agree**	
	01-02	**02-03**
COLLABORATION Items		
1. The faculty and staff share a sense of commitment to the school goals.	88.9	93.1
6. Students are encouraged to help others with problems.	74.4	79.0
16. Teachers are encouraged to communicate concerns, questions, and constructive ideas.	79.1	85.5
26. Students participate in solving the problems of the school.	25.9	29.3
28. Faculty and staff cooperate a great deal in trying to achieve school goals.	84.2	89.5
31. Teachers do not participate enough in decision making.**	34.0	27.5
40. Most problems facing this school can be solved by the principal and faculty.	68.4	65.6
ENVIRONMENT Items		
7. Faculty and staff feel that they make important contributions in this school.	83.2	86.6
9. Varied learning environments are provided to accommodate diverse teaching and learning styles.	81.5	83.7
10. The school building is neat, bright, clean, and comfortable.	80.5	72.1
14. School employees and students show respect for each other's individual differences.	69.0	67.8
29. An atmosphere of trust exists among the administration, faculty, staff, students, and parents.	57.6	62.3
38. Teachers are proud of this school and its students.	85.5	84.1
49. People in this school really care about each other.	73.4	78.3
EXPECTATIONS Items		
2. Low achieving students are given opportunity for success in this school.	90.6	94.6
3. School rules and expectations are clearly defined, stated, and communicated.	81.5	87.0
17. Students share the responsibility for keeping the school environment attractive and clean.	58.2	54.7
21. Students are held responsible for their actions.	66.0	63.0
22. Many students in this school are not expected to master basic skills at each grade level.**	21.2	19.9
27. Many students do not participate in classroom activities because of their sex, race, religion, socioeconomic status, or academic ability.**	14.1	9.8
43. Teachers have high expectations for all students.	81.1	86.6
INSTRUCTION Items		
4. Teachers use a variety of teaching strategies or models.	86.9	94.2
15. Teachers sequence learning activities so that students can experience success at each step.	85.2	87.7
24. Teachers provide opportunities for students to develop higher-order skills.	83.5	90.6
33. Curriculum guides ensure that teachers cover similar subject content within each grade level.	79.8	86.2
35. Teachers use appropriate evaluation methods to determine student achievement.	87.5	91.7
41. Pull-out programs often disrupt and interfere with basic skills instruction.**	26.9	23.2
48. Teachers use a wide range of teaching materials and media.	83.5	92.0

**Items are negatively worded, therefore a lower score = a more positive result.

Table 8 continued

Section 1 - continued SCI Items by Scale: Percent strongly agree and agree	% Strongly Agree and Agree	
	01-02	02-03
INVOLVEMENT Items		
5. Community businesses are active in this school.	55.2	54.0
11. Parents are involved in a home and school support network.	40.1	41.3
12. Parents are treated courteously when they call or visit the school.	92.6	96.7
18. Parents are invited to serve on school advisory committees.	77.1	80.4
19. Parent volunteers are used wherever possible.	72.7	81.2
32. Information about school activities is communicated to parents on a consistent basis.	78.5	89.1
37. Parents are often invited to visit classrooms.	57.6	67.4
LEADERSHIP Items		
8. The administration communicates the belief that all students can learn.	89.9	92.8
20. The administration encourages teachers to be creative and to try new methods.	82.5	87.3
34. The administration provides useful feedback on staff performance.	76.4	87.0
36. The administrative staff does not do enough to protect instructional time.**	17.8	19.2
42. The principal is an effective instructional leader.	74.1	85.9
45. The goals of this school are reviewed and updated regularly.	76.4	77.2
47. The principal is highly visible throughout the school.	74.7	83.7
ORDER Items		
13. Rules for student behavior are consistently enforced.	57.6	65.2
23. Student discipline is administered fairly and appropriately.	60.9	57.2
25. Student misbehavior in this school interferes with the teaching.**	54.5	57.2
30. Student tardiness and absence from school is a major problem.**	37.4	38.4
39. The school is a safe and secure place in which to work.	80.1	78.6
44. Teachers, administrators, and parents assume joint responsibility for student discipline.	52.5	51.8
46. Student behavior is generally positive in this school.	62.6	60.1

** Items are negatively worded, therefore a lower score = a more positive result.

SCI Section 2
Dimensions by Overall Means and National Norms

Dimension	Year 1	Year 2	National Norm
Collaboration	3.71	3.79	3.74
Environment	3.94	3.87	3.79
Expectations	3.88	3.90	3.85
Instruction	3.99	4.08	4.02
Involvement	3.78	3.93	3.77
Leadership	3.96	4.08	3.92
Order	3.35	3.27	3.22
OVERALL	3.80	3.85	3.76

Table 9

SCI: Significant Differences Between Last Year and This Year

Overall	Hotellings T	*F*	Hypothesis *df*	Error *df*	Significance
	0.10	6.40	7.00	427.0	0.000***

	2001-2002 (n = 213)		2002-2003 (*n* = 222)				
SCI Items	***M***	***SD***	***M***	***SD***	***F* (1, 463)**	***p***	***ES***
INVOLVEMENT	3.77	0.62	3.93	0.51	7.84	0.005**	+0.28
INSTRUCTION	3.98	0.49	4.08	0.48	5.21	0.023*	+0.21

Teacher Technology Questionnaire (TTQ)

The Teacher Technology Questionnaire (TTQ) was designed to capture teacher perceptions regarding their personal beliefs and practices regarding five areas: impact of technology on classroom instruction, impact of technology on students, teacher readiness to integrate technology, overall support for technology, and technical support. A total of 268 teachers completed the survey.

As seen Table 10, the Year 2 results show a positive trend as compared to Year 1. Each of the five TTQ areas had an increase in the percent of teachers agreeing or strongly agreeing with the items. The area showing the greatest percent of change was Teacher Readiness to Integrate Technology, which had a 22% increase in the percent of teachers who agreed or strongly agreed with the items (Yr. 1 = 49.4%; Yr. 2 = 71.5%). Specifically, approximately three-fourths of the teachers agreed or strongly agreed that their “computer skills were adequate to conduct classes that have students using technology” (75.7%), that they had “received adequate training to incorporate technology into [their] instruction” (72.8%), and that they “know how to meaningfully integrate technology into lessons” (71.6%). This is a shift from last year’s results that indicated teachers were most agreeable concerning the positive impact of technology on students (65.0%).

The two most highly rated items on the survey were from Technical Support. Nearly all of the teachers agreed that they “can readily obtain answers to technology-related questions” (81.0%), and that “most of the school computers [were] kept in good working condition” (79.5%). For both years, teachers had the lowest level of agreement with the “impact of technology on classroom Instruction” (Yr. 1 = 44.0%; Yr. 2 = 54.9%).

Table 10

Teacher Technology Questionnaire (TTQ)

Year 1 (2001-2002) N = 243*
Year 2 (2002-2003) N = 268*

Section 1 Category and Related TTQ Items	Percent of Teacher Response: Disagree & Strongly Disagree		Neutral		Strongly Agree & Agree	
Impact on Classroom Instruction	01-02	02-03	01-02	02-03	01-02	02-03
14. My teaching is more student-centered when technology is integrated into the lessons.	14.0	14.9	49.0	32.5	35.8	51.1
16. I routinely integrate the use of technology into my instruction.	30.0	18.7	28.8	29.1	39.5	50.4
18. Technology integration efforts have changed classroom learning activities in a very positive way.	9.9	6.0	28.8	25.0	60.9	67.2
20. My teaching is more interactive when technology is integrated into the lessons.	14.8	18.3	44.4	29.1	39.9	50.7
Overall	***17.2***	***14.5***	***37.8***	***28.9***	***44.0***	***54.9***
Impact on Students						
3. The use of computers has increased the level of student interaction and/or collaboration.	9.9	10.8	26.3	20.1	63.4	67.9
8. The integration of technology has positively impacted student learning and achievement.	9.1	7.1	24.3	19.4	65.0	71.6
10. Most of my students can capably use computers at an age-appropriate level.	7.0	7.5	18.5	15.7	73.7	75.7
19. The use of technology has improved the quality of student work.	11.9	11.9	30.0	32.5	58.0	53.7
Overall	**9.5**	**9.3**	**24.8**	**21.9**	**65.0**	**67.2**
Teacher Readiness to Integrate Technology						
5. I know how to meaningfully integrate technology into lessons.	17.3	9.0	31.7	17.9	50.2	71.6
9. I am able to align technology use with my district's standards-based curriculum.	14.0	9.3	38.3	22.8	46.1	65.7
11. I have received adequate training to incorporate technology into my instruction.	25.5	10.1	27.6	16.4	46.1	72.8
12. My computer skills are adequate to conduct classes that have students using technology.	18.5	9.7	25.5	13.1	55.1	75.7
Overall	***18.8***	***9.5***	***30.8***	***17.6***	***49.4***	***71.5***
Overall Support for Technology in the School						
4. Parents and community members support our school's emphasis on technology.	6.2	6.3	29.2	30.2	64.2	61.2
13. Teachers receive adequate administrative support to integrate technology into classroom practices.	14.0	6.0	28.4	15.7	57.2	76.9
15. Our school has a well-developed technology plan that guides all technology integration efforts.	17.3	11.9	33.3	33.2	49.0	52.6
17. Teachers in this school are generally supportive of technology integration efforts.	7.4	6.3	19.3	17.9	72.8	75.0
Overall	***11.2***	***7.6***	***27.6***	***24.3***	***60.8***	***66.4***
Technical Support						
1. Most of our school computers are kept in good working condition.	9.1	9.3	9.9	10.4	80.2	79.5
2. I can readily obtain answers to technology-related questions.	12.8	6.3	14.8	11.6	71.6	81.0
6. My students have adequate access to up-to-date technology resources.	19.8	17.2	24.7	17.5	52.7	62.3
7. Materials (e.g., software, printer supplies) for classroom use of computers are readily available.	23.0	22.0	21.4	14.9	55.6	61.2
Overall	***16.2***	***13.7***	***17.7***	***13.6***	***65.0***	***71.0***

*Note: Item percentages may not total 100% because of missing input from some respondents.

TTQ Section 2: Participant Information

Percentages by Categories

Note: Percentages may not total 100% because of missing input from some respondents.

Item		01-02	02-03
How would you rate your level of computer ability?	Very Good	16.9	16.4
	Good	25.5	41.4
	Moderate	45.7	34.7
	Poor	11.5	6.3
	No Ability	0.0	0.0
Do you own a home computer?	Yes	89.7	89.2
	No	9.1	10.1
If yes, do you use your home computer to access instructional materials on the Internet?	Yes	71.6	72.8
	No	26.1	19.7
If yes, do you use your home computer to prepare instructional materials?	Yes	66.1	69.5
	No	30.3	21.8

Even though two-thirds of the teachers were in agreement (67.2%) with regard to the positive impacts of technology on classroom learning, only about half of the teachers agreed that they routinely integrate technology into their instruction (50.4%), or that their teaching was more student-centered (51.1%) or Interactive (50.7%) when technology is integrated

Responses to the last items on the TTQ indicate that teacher familiarity and confidence with computers is increasing. When asked to rate their level of computer ability, there was a 15% increase in the number of teachers who rated their ability as very good to good. However, there were no notable differences in the number of teachers who had home computers, used the home computers to access instructional material on the web, or used them to prepare classroom materials.

Inferential results: Year 1 vs. Year 2. Inferential analyses, using MANOVA, confirmed the impression of more favorable Year 2 responses. The MANOVA, treating the five survey categories (impact on classroom instruction; impact on students; teacher readiness; overall support; and technical support) as dependent measures, was highly significant, $F(5, 459) = 10.19$, $p < .0001$. Follow-up univariate analyses yielded significance on four of the five categories (see Table 11 and Figure 5). The area indicating the greatest degree of significant difference was "teacher readiness to integrate technology" (Yr.1 $M = 3.40$; Yr. 2 $M = 3.85$), which had an Effect Size of .58. Two other areas had Effect Sizes greater than 0.25: Impact on classroom instruction ($ES = -0.27$), and overall support ($ES = -0.27$).

Figure 5

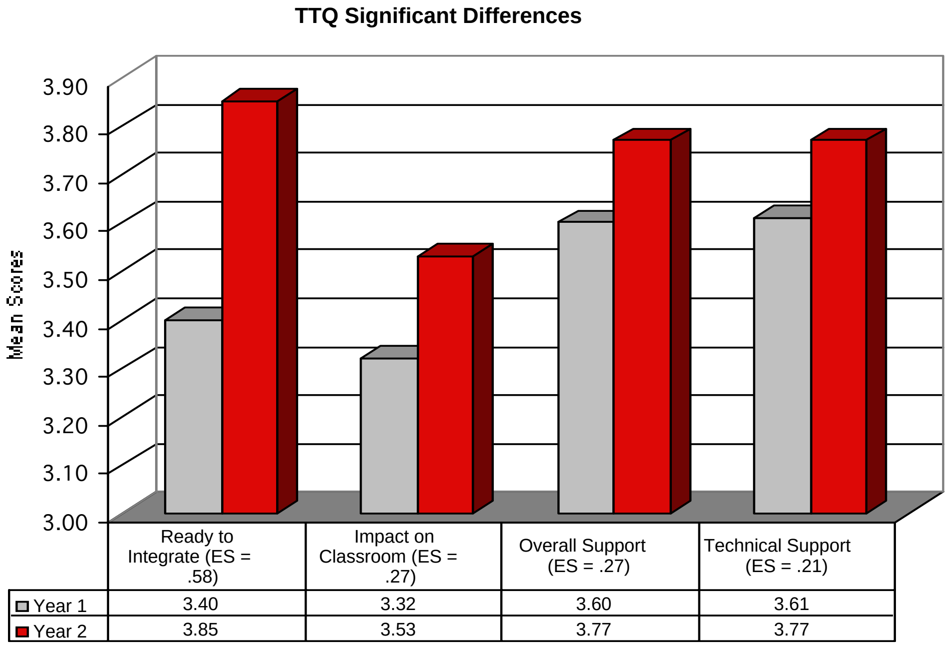


Table 11

TTQ: Significant Differences Between Last Year and This Year

Overall	Hotellings T	*F*	Hypothesis *df*	Error *df*	Significance
	0.11	10.19	5.00	459.00	0.000***

	2001-2002 (n = 243)		2002-2003 (*n = 268*)				
TTQ Items	***M***	***SD***	***M***	***SD***	***F (1, 463)***	***p***	***ES***
Readiness to Integrate Technology	3.40	0.80	3.85	0.76	38.76	0.000***	0.58
Impact on Classroom Instruction	3.32	0.75	3.53	0.78	8.26	0.004**	0.27
Overall Support	3.60	0.62	3.77	0.63	8.55	0.004**	0.27
Technical Support	3.61	0.76	3.77	0.75	5.56	0.019*	0.21

Inferential results: No or Partial Training vs. Full Training. Inferential analyses, using MANOVA, were also conducted to compare teachers who had received no or partial technology training vs. those who had completed the technology training and were among those whose classes were observed. The MANOVA again treated the five survey categories (impact on classroom instruction; impact on students; teacher readiness; overall support; and technical support) as dependent measures. The analysis revealed significant differences between the trained and partially trained teachers *F*(5,184) =

3.64, *p* < .004 (see Table 12). The follow-up univariate analyses yielded significance on two of the five categories (Figure 6 and Table 12) both with Effect Sizes exceeding .50. The first area was "Teacher readiness to integrate technology," with the fully trained teachers (*n* = 33) reporting significantly more agreement (no/partial *M* = 3.84; full *M* = 4.22) than teachers with no or partial training (*n* = 201). These teachers also reported significantly more agreement with regard to the "Impact of technology on classroom instruction (no/partial *M* = 3.49; full *M* = 3.93) than teachers who had received no or partial technology training.

Figure 6

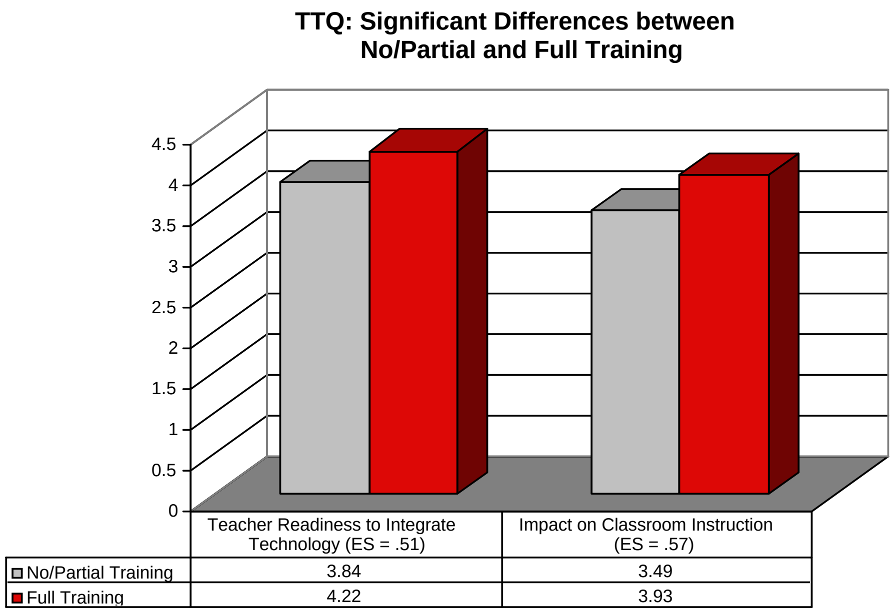


Table 12

TTQ: Significant Differences Between No or Partial Training and Full Training

Overall	Hotellings T	*F*	Hypothesis *df*	Error *df*	Significance
	0.99	3.64	5.00	184.00	0.004**

	No or Partial Training (*n* = 201)		Full Training (*n* = 33)				
Items	***M***	***SD***	***M***	***SD***	***F (1,188)***	***p***	***ES***
Teacher Readiness to Integrate Technology	3.84	0.74	4.22	0.75	5.95	0.016*	+0.51
Impact on Classroom Instruction	3.49	0.76	3.93	0.93	7.22	0.008**	+0.57

*p<.05, ***p<.001

Summary. The TTQ results for 2002-2003 show significant positive changes from the previous year in teacher perceptions of their readiness to integrate technology. This readiness is reflected in the high level of reported confidence with regard to teacher computer skills being adequate enough to conduct classes that have students use technology. There was also strong agreement that the teachers could readily obtain answers to technical problems and that school computers were kept in good working condition. However, approximately 50% of teachers were still less positive with regard to the impact of technology on their instruction. When examining the TTQ results by amount of technology training, two significant differences were revealed – both suggesting that the training had an educationally sound impact on teacher readiness to integrate technology and teacher belief that technology has a positive impact on classroom instruction.

Technology Skills Assessment (TSA)

The primary purpose for the TSA was to assess teacher perceptions of their technology ability as noted in the TEKS Technology Applications for grade 3-5 students. The survey begins by asking the teachers to rate "How easily…" (Not at all, Somewhat, Very Easily) they could use or complete 47 computer-related tasks divided into six basic areas: computers, software, multimedia, Internet, advanced skills, and using technology for learning. Each of these areas had one multiple-choice question that required the teachers to demonstrate knowledge by selecting the correct response. The teachers were also asked to rate "How well" they understood three technology-related policy and ethics (Not at all, Somewhat, Very well) items. A summary of the results from 285 TSA surveys is presented in Table 13.

Teacher confidence was once again the highest for *Computer Basics*, with slightly over 80% of the Year 2 teachers as compared to 16% of the Year 1 teachers indicating that they could Very Easily (80.2%) complete each item. The same was seen for the multiple-choice item for this area, with 91.5% of the teachers selecting the correct response. A majority of the teachers also reported a high level of knowledge with regard to *Policy and Ethics* (65.1%) and *Software Basics* (61.1%), however less than half (37.9%) of the teachers responded correctly to the related multiple choice item. Only about one-fourth of the teachers indicated they could very easily complete the tasks that required advanced skills (26.4%) or those that used technology for learning (25.7%)

Table 13

Technology Skills Assessment Data Summary

Section 1 Category and Related TSA Items	Percent of Teacher Agreement					
	Not at All		Somewhat		Very Easily	
Computer Basics ~ How easily can you …	01-02	02-03	01-02	02-03	01-02	02-03
1.Use a spell check tool.	5.6	2.9	14.0	8.1	80.0	88.6
2.Create basic computer documents (word processed) in a timely manner.	6.0	3.3	23.9	14.0	69.5	82.0
3.Use help menus for software programs.	6.3	3.3	38.6	21.7	53.7	74.3
4.Use basic computer terms like mouse, keyboard, hard drive, CD-ROM, and monitor.	1.8	0.0	15.8	7.7	81.4	91.9
5.Save documents so they can be opened on both a Macintosh and PC.	20.7	11.4	29.1	25.4	49.1	62.1
6.Create folders on a hard drive or disk.	16.1	7.4	35.1	18.8	47.4	73.2
7.Save files to specific folders.	13.3	4.8	33.0	22.1	52.6	73.2
8.Locate and delete unwanted files.	7.7	2.6	25.6	19.1	65.3	77.2
9.Use keyboard commands to cut, copy, or delete text.	11.2	5.5	28.8	20.2	59.6	74.3
10.Proficiently use a mouse and keyboard.	1.4	0.0	15.8	8.5	81.8	91.5
11.Print a document using "Print" from the File menu and/or the toolbar icon.	2.1	1.1	9.1	4.4	88.1	93.4
Computer Basics: Overall	***8.4***	***3.8***	***24.4***	***15.5***	***66.2***	***80.2***
Software Basics						
12.Use software preview features to check work.	17.2	7.7	30.5	22.8	51.6	68.8
13.Open and use software programs that are installed on your computer.	3.5	1.5	29.5	18.4	66.0	79.4
14.Work with and move between two open programs (e.g., Internet and database) to create a product.	30.9	11.8	30.9	31.6	38.2	56.3
15.Describe the difference between downloading and installing software.	21.4	10.3	36.1	30.5	42.1	58.5
16.Save documents so they can be opened in a different program (e.g., from Word to Word Perfect).	33.7	14.7	32.6	34.6	33.0	49.6
17.Install software.	26.3	14.7	30.2	26.8	40.0	53.7
Software Basics: Overall	***22.2***	***10.1***	***31.6***	***27.5***	***45.2***	***61.1***
Multimedia Basics						
18.Import digital video from a camera to a computer.	62.1	47.4	21.1	26.1	16.5	25.7
19.Record and save your voice onto a computer.	72.6	57.7	18.9	22.8	8.1	19.5
20.Use a scanner to import a photo or document into a computer.	49.8	39.7	25.6	23.9	23.9	35.7
21.Play a music CD on the computer.	11.2	7.4	22.1	13.6	66.0	78.7
Multimedia Basics: Overall	***24.7***	***38.1***	***26.1***	***21.6***	***48.4***	***39.9***
Internet Basics						
22.Connect to the Internet with a modem (phone, cable).	18.2	11.8	24.2	11.8	57.2	76.1
23.Use Boolean strategies for Internet searches.	62.1	39.0	20.0	21.7	15.8	37.1
24.Use appropriate software and the Internet to find audio, video, and graphics for lesson plans.	38.2	16.5	36.5	37.5	24.6	44.9
25.Use the Internet to find help when you have a computer problem.	43.9	26.5	33.7	35.7	22.1	36.4
26.Determine if information you find on the Internet is accurate and valid.	40.0	23.9	41.1	39.7	18.9	35.7
27.Evaluate Internet search strategies to determine those that are most efficient.	41.4	24.3	38.2	35.3	20.4	39.3
28.Determine the usefulness and appropriateness of digital information.	54.7	33.8	32.3	33.1	12.3	32.0
Internet Basics: Overall	***42.6***	***25.1***	***32.3***	***30.7***	***24.5***	***43.1***

Table 13 - continued
Advanced Skills

29.Use more advanced computer terms like megahertz, gigabytes, and RAM.	53.0	38.6	31.2	39.3	14.4	21.0
30.Access information on local area networks (LANs) and wide area networks (WANs).	60.0	39.0	26.3	34.2	11.6	26.1
31.Use appropriate digital layout and design to meet the needs of defined audiences.	68.1	47.8	20.7	32.0	8.4	18.8
32.Use appropriate digital layout and design for the selected media (e.g., multimedia, web, print).	67.0	45.6	22.8	32.0	8.4	21.3
33.Publish information in a variety of media (e.g., printed, monitor display, web-based, video).	61.1	38.6	28.1	35.3	8.4	23.9
34.Connect a computer to a local server to share files.	67.0	47.1	23.9	26.8	7.7	24.6
35.Determine if a software program works with an operating system.	64.9	48.5	23.5	26.5	9.1	23.2
36.Print to a specific printer when connected to a network that has more than one printer.	46.0	28.7	28.8	26.1	23.5	44.1
37.Use presentation software to share information with specific audiences.	58.6	30.1	24.6	32.0	14.4	34.9
Advanced Skills: Overall	***60.6***	***40.4***	***25.5***	***31.6***	***11.8***	***26.4***
Using Technology for Learning						
38.Use multimedia software to enhance learning experiences.	42.8	18.8	38.6	42.6	16.5	36.4
39.Use appropriate software (e.g., word processing, graphics, databases, spreadsheets, simulations, and multimedia) to express ideas and solve problems.	38.2	16.5	36.8	43.8	22.8	38.2
40.Use text and graphics to create and modify solutions to problems.	52.6	26.1	28.8	41.9	16.8	30.9
41.Use digital audio and video to create and modify solutions to problems.	70.2	44.1	21.8	37.9	6.3	16.5
42.Use communication tools to participate in group projects.	60.0	33.5	24.9	39.0	11.9	25.4
43.Manipulate information in interactive digital environments (e.g., simulations, virtual labs, field trips).	71.6	50.4	20.0	30.5	6.0	17.6
44.Participate in a listserv, chat, and bulletin board session.	62.1	41.2	23.9	25.4	11.9	32.0
45.Create an electronic teaching portfolio to evaluate your work.	74.7	52.2	17.9	29.8	5.3	16.2
46.Evaluate electronic portfolio products.	74.7	52.2	18.9	30.9	3.5	14.7
47.Create technology tools to assess student work (e.g., checklists, timelines, rubrics).	58.9	31.3	26.3	37.9	11.6	28.7
Using Technology for Learning: Overall	**60.6**	**36.6**	**25.8**	**36.0**	**11.3**	**25.7**
Policy and Ethics						
48.My school's acceptable use policy.	6.0	1.8	25.3	18.0	64.6	76.8
49.The concept of a school site license for software.	9.5	5.9	30.2	24.3	56.5	66.2
50.How to determine if it is legal to copy a software program or another individual's electronic work.	18.6	9.9	38.2	34.2	38.6	52.2
Policy and Ethics: Overall	***11.4***	***5.9***	***31.2***	***25.5***	***53.2***	***65.1***

Section 2 Multiple Choice Questions

Responses to multiple-choice questions

Correct answers to the multiple-choice questions are in ***BOLD***.

Computer Basics

Under which menu item is the "New" document option typically found?

	01-02		02-03	
File	**256**	**89.8%**	**249**	**91.5%**
Edit	3	1.1%	4	1.5%
View	3	1.1%	6	2.2%
Insert	1	0.4%	1	0.4%

Software Basics

How should a Macintosh-created word processed document be named so it can be opened on a PC?

	01-02		02-03	
Document.wp	30	10.5%	25	9.2%
Document.mac2pc	84	29.5%	85	31.3%
Document.doc	**74**	**26.0%**	**103**	**37.9%**
Document.exchng	21	7.4%	13	4.8%

Table 13 - continued

Multimedia Basics

Which of the following is a format used to save graphics?

	01-02		02-03	
grf	82	28.8%	56	20.6%
drw	6	2.1%	4	1.5%
gif	**96**	**33.7%**	**140**	**51.5%**
img	42	14.7%	37	13.6%

Internet Basics

Which of the following is a well-known Internet search browser?

	01-02		02-03	
Microsoft.com	22	7.7%	12	4.4%
Google.com	**172**	**60.4%**	**234**	**86.0%**
Info.com	13	4.6%	2	0.7%
SearchInternet.com	37	13.0%	8	2.9%

Advanced Skills

If you were asked to describe the size of a hard drive, which measure would be most appropriate to use in your description?

	01-02		*02-03*	
quadrite	2	0.7%	1	0.4%
gigabytes	**183**	**64.2%**	**200**	**73.5%**
Megahertz	58	20.4%	44	16.2%
Pixels	1	0.4%	0	0.0%

Using Technology for Learning

You have decided to have your students determine which of three cities has the greatest rainfall during the month of February, and provide the results in the form of a graph. Which of the following would be the best type of software for the students to use.

	01-02		02-03	
Database	73	25.6%	55	20.2%
Spreadsheet	**139**	**48.8%**	**176**	**64.7%**
Organizer	9	3.2%	11	4.0%
Publisher	22	7.7%	5	1.8%

Technology Training

*How many **Foundation** modules have you completed?*		
	01-02	02-03
None	63.2%	33.1%
Less than 5	24.2%	3.3%
5 - 10	1.1%	12.9%
More than 10	0.4%	40.8%
*How many **West Orange Technology Training** sessions have you completed?*		
	01-02	02-03
None	37.5%	36.0%
One	13.3%	7.7%
Two	14.7%	15.4%
Three	11.2%	6.3%
Four	6.3%	4.4%
Five	0.7%	0.7%
More than Five	8.1%	16.2%

Technology Training. There was over a 50% Year 1 (01.5%) to Year 2 (53.7%) increase in the number of teachers indicating that they had completed 5 or more Foundation Program Modules. However, there was only a 2% increase in the percent of teachers reporting that they had completed two or more West Orange Technology training sessions.

Inferential results: Year 1 vs. Year 2. A MANOVA comparing the means of Year 1 and Year 2 on the seven TSA categories (computer, software, multimedia, Internet, advanced skills, using technology for learning, and policy and ethics) yielded a highly significant difference, $F(7, 409) = 7.47$, $p = .0001$. Univariate analysis of variance (ANOVA) was then separately performed on each category. As seen in Figure 7 and Table 14, significant differences with Effect Sizes ranging from .33 to .64 were found across the seven areas. The greatest degree of significant difference was for the category "using technology for learning" (Yr.1 $M = 1.52$; Yr. 2 $M = 1.91$), which had an Effect Size of

.64. A similarly high Effect Size (ES = 59) was found for Internet Basics (Yr.1 *M* = 1.86; Yr. 2 *M* = 2.23).

Figure 7

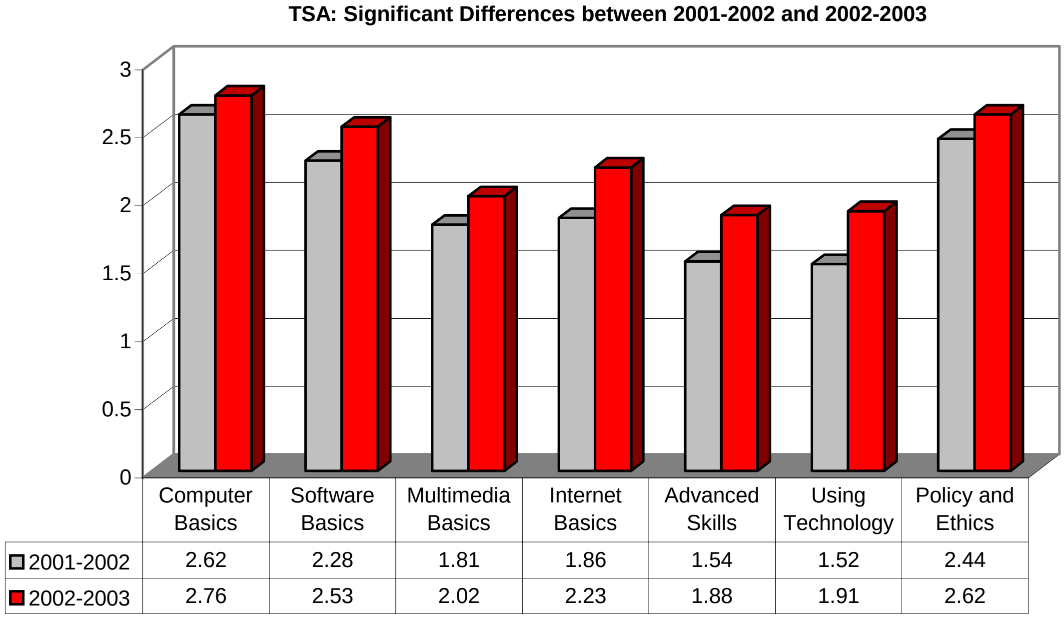


Table 14

TSA: Significant Differences Between Last Year and This Year

Overall	Hotellings T	*F*	Hypothesis *df*	Error *df*	Significance
	0.13	7.47	7.00	409.00	0.000***

TSA Items	2001-2002 (n = 272)		2002-2003 (n = 285)				
	M	*SD*	*M*	*SD*	*F (1, 415)*	*p*	*ES*
Computer Basics	2.62	0.41	2.76	0.37	13.23	0.000***	0.36
Software Basics	2.28	0.60	2.53	0.54	20.31	0.000***	0.44
Multimedia Basics	1.81	0.56	2.02	0.63	13.07	0.000***	0.35
Internet Basics	1.86	0.62	2.23	0.64	36.17	0.000***	0.59
Advanced Skills	1.54	0.61	1.88	0.69	28.52	0.000***	0.52
Using Technology	1.52	0.56	1.91	0.66	42.92	0.000***	0.64
Policy and Ethics	2.44	0.58	2.62	0.50	10.65	0.001***	0.33

Inferential results: No or Partial Training vs. Full Training. As with the TTQ, A MANOVA, was once again conducted to compare teachers who had received no or partial technology training vs. those who had completed the technology training. The MANOVA treated the seven TSA survey categories as dependent measures. The analysis revealed significant differences between the trained and partially trained teachers $F(7,176) = 2.51$, $p < .018$ (see Table 15). The follow-up univariate analyses yielded significance on five of the seven categories (Figure 8 and Table 15). The area showing the most significant difference (*ES* = .72) was once again "using technology for learning (no/partial *M* = 1.83; full *M* = 2.30). The remainder of the differences all had Effect Sizes greater than .40, thus indicating a strong educational impact.

Figure 8

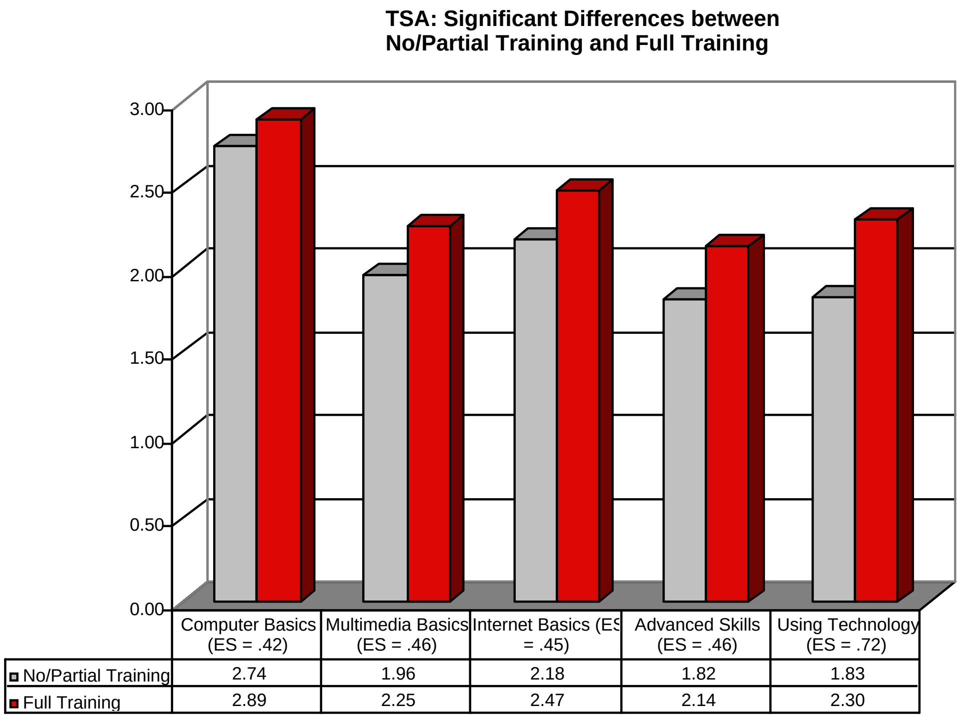


Table 15

TSA: Significant Differences Between No/Partial Training and Full Training

Overall	Hotellings T	*F*	Hypothesis *df*	Error *df*	Significance
	0.99	2.51	7.00	176.00	0.018*

	No/Partial Training (*n* = 207)		Full Training (*n* = 33)				
Items	***M***	***SD***	***M***	***SD***	***F (1, 463)***	***p***	***ES***
Computer Basics	2.74	0.38	2.89	0.17	4.23	0.041*	0.42
Multimedia Basics	1.96	0.63	2.25	0.64	4.89	0.028*	0.46
Internet Basics	2.18	0.66	2.47	0.53	4.63	0.033*	0.45
Advanced Skills	1.82	0.69	2.14	0.68	4.82	0.029*	0.46
Using Technology	1.83	0.65	2.30	0.64	12.13	0.001***	0.72

Summary. The TSA results revealed an overall increase in teacher confidence to complete a wide variety of computer-related tasks. The greatest level of confidence was with computer, software, Internet and multimedia basics. The teachers who had completed the technology training were significantly more confident with their ability to use technology as a learning tool.

CONCLUSIONS

The conclusions of the study will be presented in association with each of the major research questions in the respective sections below.

To what degree and how is technology integrated with classroom instruction by teachers in general* and those who have received Foundation and/or integration training through the Enhanced Learning Academy?

Classroom observation data from both the SOM and SCU revealed significant differences in the degree and the way in which teachers integrate technology into their teaching. The most striking was a 40% increase in the use of computers as an instructional delivery tool and the 50% increase in student use of technology as a learning tool, which was seen in over 65% of the classroom observations. Another noteworthy increase in the use of computers is seen in data from the RSCA, which revealed that teachers integrated technology with approximately one third or more of their student-centered activities, as compared to less than 10% the previous year. Although students had more access to computers and digital tools, significant increases in the types of computer activities observed were only found for the use of Internet and presentation software. Word processing and educational software were the other two most frequently observed applications. Despite the limited scope of technology tools that were used to support classroom instruction, a dramatic improvement was seen in teacher ability to create and implement activities that meaningfully integrated the use of technology to enhance student learning. Specifically, meaningful (from somewhat to very meaningful) use of computers was only seen in 9.3% of the Year 1 observations as compared to 41.2% in Year 2. These results are highly suggestive that the STARK Program is effectively impacting technology integration efforts in the target schools.

*Note. The Year 2 classroom observations were once again conducted during pre-arranged visits to classrooms of teachers who had received technology training, therefore, the results reflect trained teachers rather than teachers in general. The Year 3 data will include all teachers.

To what degree do integration-trained teachers use methodologies that, consistent with STARK Program goals, stress higher-order learning and student-centered learning activities?

In over two-thirds of the classroom observations, teachers assumed the role of coaches or facilitators and technology was being used as a tool to support learning. Other activities that foster critical thinking and student engagement were seen in over 50% of the visits. These included experiential hands-on learning (57.7%), teacher provision of higher-level instructional feedback to students (55.8%), and teacher use of higher-level questioning strategies (53.8%). Although no significant increases were found when specifically examining the quality with which teachers implement student-centered activities, it is promising to note that all mean scores were above average – with five being higher than Year 1 ratings. The data indicate continued growth toward teacher competency with non-traditional instructional strategies. However, professional development efforts may want to increase the focus on better preparing teachers to implement these methods to increase the frequency with which they are utilized.

To what degree have teachers acquired the technology skills specified in the Texas State standards?

Impressive increases were seen in teacher confidence in all seven categories of technology skills. Nearly all (90% or more) of the teachers indicated that they could easily complete basic computer and software tasks and that they understood the policy and ethics of technology use. Three-fourths (75%) percent felt confident when using the Internet and over 60% reported that they could easily or very easily complete multimedia and/or advanced tasks, and use technology for learning. As would be expected, the teachers who had completed the technology training were significantly more confident with their ability to use technology as a learning tool – again an indication of successful teacher training through the STARK Program.

What are school outcomes in school climate and teacher uses of and attitudes toward technology? To what extent do these variables (a) reflect Foundation training and STARK Program goals, and (b) correlate with one another and with implementation success?

Results from the School Climate Inventory were again above national norms, suggesting that the environment of 10 the participating schools was supportive of school-wide initiatives such as technology integration. This positive climate was evidenced in the significant increases in frequency of classroom use of technology and teacher ability to create and implement meaningful computer activities. Positive teacher attitudes are also reflected in the TTQ results, which showed significantly higher teacher readiness to integrate technology and more confidence to conduct classes that have students use technology. A contributing factor to this increased confidence could perhaps be the increased level of computer literacy as reported on the TSA, plus the ready access to technical support provided by the schools and district. Significant differences were again revealed when examining results by the degree of training received – suggesting that the STARK Program had an educationally sound impact on teacher readiness to integrate technology and teacher belief that technology has a positive impact on classroom instruction. The overall results do suggest a positive trend in achieving the STARK Program goals and successful implementation, however the current efforts need to continue or increased to impact the approximately 50% of teachers who were still less positive with regard to the impact of technology on their instruction.

What factors appear most instrumental in determining schools' success at achieving the goals and overall implementation of the STARK Program?

Below is a list of key factors from the Year 2 study that appeared to have influenced the progress being made toward achievement of the STARK Program implementation and goals. As seen, the factors cross key elements that are critical for program success:

Significant differences in instructional practices

- Increased use of student-centered learning
- Increased use of computers for instructional delivery
- Increased use of technology as a learning tool

Significant differences in the quality of instructional practices

- Increased use of very meaningful computer activities

Significant differences in school climate

- Increased level of parent and community involvement
- Increased level of instruction (e.g., more variety, media resources, higher-order learning)

Significant differences in teacher attitudes and beliefs regarding technology integration

- More teachers felt ready to integrate technology

- More teachers believed technology positively impacts classroom instruction
- More teachers agreed technology efforts are well-supported

Significant differences in teacher computer skills

- More teachers reported confidence with technology tasks

Overall, the triangulation of positive changes suggests a strong synergy between the diverse factors that resulted in impressive progress toward achieving the STARK Program goals during the second year of implementation. As seen, the schools had positive climates, teacher technological competence increased, and classroom practices engaged students in meaningful technology-supported activities. These positive results suggest that program implementation for Year 3 should emulate Year 2, but with increased intensity to ensure all teachers are impacted.

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