

St. Louis Public Schools

A Formative Assessment of Educational Technology

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In Summer 2001, the St. Louis Public Schools initiated a formative evaluation of the use, allocation, and impact of information technology in its schools and classrooms. The district's basic intent was two-fold. First, the district set out to develop a set of descriptive indicators for *how* technology is to impact students and teachers. Second, St. Louis wanted to gather baseline data on the *current status* of technology use. This current status, juxtaposed with the developed indicators, would exist as a series of evaluative findings. Recommendations for change and improvement could then be developed from these findings.

With the following report, St. Louis has achieved its goals for the initial steps of a formative evaluation.

Evaluation Questions and Indicator Rubrics

St. Louis's complete rubrics are included in the Appendix of this report. The two evaluation questions, with related basic key indicators, are as follows:

- *Do St. Louis Public School **students** effectively use instructional technology to enhance their learning and support proficiency in the state standards and benchmarks?*

Key Indicator: Technology in St. Louis Public Schools is thoroughly integrated across the entire learning process – including the assessment of student work and progress. Instructional technology is used to support collaborative, project-based learning that models the skills and practices required in the real world.

Through the thoughtful integration of technology, students are actively involved in their learning. They are using technology to find, discover, analyze, and present information within a range of curriculum activities directly aligned with core curriculum standards and benchmarks.

- *Does StLPS provide adequate support and appropriate professional development resources for its **teachers** to effectively use technology to positively impact student achievement aligned with district goals and expectations?*

Key Indicator: Through technology professional development, teachers have developed a clear connection between their technology skills and how these skills can be integrated into the classroom environment for improved student achievement. Teachers use technology to facilitate instruction that addresses the needs of all learners and diverse learning styles.

Teachers use technology tools and resources to make more efficient and focused use of their time.

Technology professional development in St. Louis Public Schools is readily available and accessible to teachers at all levels of technology use and proficiency. Technology professional development is purposeful and tied to district expectations for teacher development. Teacher technology skills are developed within the context of instructional needs, strategies, and teacher productivity.

Teachers understand their role in sharing the skills they develop in their technology professional development

Summary Rubric Scores

The Evaluation Committee reviewed a full range of data collected in response to the evaluation questions. This data, combined with Committee members' own experience as St. Louis teachers, administrators, parents, etc., resulted in the following rubric scores.

For the *Student Impact* (first) evaluation question, the Committee scored district performance as a **Level 2**. Level 2 performance is characterized within the rubric as:

Students across the district use technology tools as a way of producing final work products. It only replicates what students would do traditionally without the availability of technology tools or resources. Students seldom use technology as a tool for collaboration. Technology use is often seen as an “add on” to traditional learning activities.

Technology use is almost always assigned by teachers. Students seldom make personal choices to use technology within their learning activities. Technology use is often perceived of as an end in itself and not tied to real-world problems or situations. While students are “motivated” to use technology, it does not appear that there is any connection between this motivation and curriculum-based learning.

Some classrooms are organized in a student-centered manner, although these tend to be found in isolated pockets and grade levels. Most teachers still teach in teacher-focused classrooms.

For the *Teacher Use* (second) evaluation question, the Committee scored district performance also as **Level 2**. Level 2 performance in the student impact rubric is characterized as:

Most teachers have minimum technology skills related to basic computer applications (e.g., email, word processor, WWW).

The district is in the process of creating and adopting a set of teacher standards and expectations which map technology skills to professional productivity and curriculum-based learning activities.

The district has developed a process for the sharing of technology skills arising from technology professional development, but teachers are not actively participating in this process.

Again, the full set of indicators organized into rubrics is produced in the Appendix of this report. Further, a complete discussion of the findings that supported these scores and the scoring process, is presented in the body of this report (Chapters 2 and 3).

Conclusions and Recommendations

While it might be tempting to simply take the above scores and assume that the evaluation is "done", this is by no means the spirit or intention of a *formative* evaluation. Rather, the primary point of the Evaluation Committee's efforts is to consider where St. Louis now stands on a performance continuum from unacceptable (Level 1) to ideal (Level 4). Current standing is then compared with the next and succeeding higher levels of performance to determine next steps for continuous improvement. In line with this formative philosophy, we offer the following recommendations for how the District can improve its use of technology as a tool for teaching and learning.

Please note that the following statements are simply summaries of the rich set of recommendations presented in Chapter 4 of this report.

- Adopt a planful approach to the district's technology effort
- Adopt, document, and communicate a complete set of teacher and student benchmarks for how technology is to be integrated into St. Louis's teaching and learning environment
- Design and offer effective professional development that focuses on developing models for effective integration of technology within the St. Louis curriculum
- Work to improve communication and trust surrounding issues of technology
- Augment existing technical support staff
- Address instructional support issues

Finally, at the conclusion of Chapter 4 we discuss two issues of importance to the district and its Technology Evaluation Committee. Namely, we review the linkage between educational technology and improved student performance as measured by traditional educational assessments; and we also discuss the "cost and benefit" of making continued investments in educational technology.

We conclude that ultimately technology's value is relative to how the district manages a complex picture of instructional reform and change. If the district understands and supports technology's role as a tool for change – primarily by properly supporting teachers in their technology learning and use – then we believe that the district has made a wise investment that both should and must be continued.

Next Steps

Implicit in the design of this evaluation is the fact that this is a *formative* process. The data gathered and discussed in the report is baseline data. The current performance assessment is an initial assessment. St. Louis's performance is expected to be impacted by implementation of the recommendations detailed in Chapter 4.

In the coming school years, the district should reapply the assessments detailed in this report. This means gathering data, considering the data vis-à-vis the performance rubrics, and reviewing and making recommendations for change to the District's technology support/implementation program. There are also several modifications, or areas for further research, that the district could make to its annual assessment process. These are:

- Increased focus on *administrator* data to determine the vision and capacity for district and building administrators to be instructional technology leaders
- More detailed data on *teacher* attitudes and opinions regarding teacher and student technology competencies
- Mapping of District Strategic Technology Plan goals to evaluation questions and recommendations

Finally, it is very important that the district maintain the capacity of the Evaluation Committee -- either as a distinct committee or perhaps folded into the District Technology Committee -- to monitor the overall impact of technology on St. Louis's teachers and students. Important within this monitoring function is the maintenance of the "historical memory" of recommendations made (e.g., those in this report) and how or if they were implemented. In other words, someone or some group needs to remember the recommendations and hold the District accountable for their implementation.

Purpose of this Evaluation

St. Louis Public Schools (St. Louis) has initiated a formative evaluation of technology's impact on teaching and learning throughout the district. This report represents the initial output of the first year of this formative evaluation effort. This evaluation will provide baseline data related to the district's current technology efforts and will establish a starting point for the district's consideration of its technology infrastructure, professional development, and other key facets of technology integration implementation.

As external evaluation consultants, Sun Associates has been retained to create a formative evaluation framework, to collect/analyze initial data, and to provide a series of evaluation findings. Ultimately, these findings will establish a foundation for future strategic technology decision-making and ongoing investigation of technology's impact in St. Louis.

St. Louis's technology evaluation addresses two basic questions related to instructional technology implementation. These are:

1. How effectively has St. Louis allocated district technology resources so that teachers can meet the needs of today's learners?
2. How has technology improved St. Louis student work/learning?

With these as their basic evaluation questions, a district technology evaluation committee composed of stakeholders from throughout the district and local community has developed a set of indicator rubrics (see the [Appendix](#)). The committee's rubrics identify different levels of achievement towards meeting an "ultimate" level or indicator of success for each evaluation question.

It is important to note that as part of its evaluation process, the evaluation committee has spent considerable time defining "success." This has occurred through debate and reflection on what behaviors should be exhibited by students who have been positively impacted by technology. Similar attention has been paid to defining exemplary teacher use of technology. This reflection has had substantial benefits to the district outside of the specifics of the evaluation project.

Glossary of Terms

Within this evaluation report, we use a variety of terms, which may not have obvious definitions to the reader. For the sake of clarity, we offer the following definitions:

Constructivism

The learning theory that is based on the principle that students create -- i.e., construct -- knowledge from new information by tying it to prior knowledge or experience.

Constructivist learning is not linear, but rather recursive, iterative, and tied to particular situations.¹

Critical Thinking

There are several definitions for this term. We like this one as it introduces the notion of gathering information from "communication", which could be extended to mean technology: "Critical thinking is the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action."²

Engaged Learning

Engaged learning environments are those where students are engaged in authentic, multidisciplinary tasks; where they are interactively participating in classroom activities; where there is collaboration with fellow learners and experts; where students are heterogeneously grouped; where students are active explorers of information; where the teacher is a facilitator for learning and not a "dispenser" of knowledge; and where assessment is based on students' performances of real tasks.³

Instructional Technology

Information technology utilized in the learning environment as part of a designated learning activity. The term also extends to those technology tools used as a production or presentation device by students and teachers.

Integration/Technology Integration

¹ Brown and Moffett, 1999 also Wiggins and McTighe, 1998. For a good overview of technology's value as a constructivist tool, see www.sedl.org/tap/newsletters/winter98/welcome.html

² National Council for Excellence in Critical Thinking, 1999.

³ Means, 1994

The use of instructional technology tools – and information resources delivered by instructional technology tools -- by students and teachers to support existing curricular goals and objectives in a variety of learning activities.

Teacher Productivity Tools

Computer hardware, software applications such as word processors, spreadsheets, presentation managers, and database management programs.

Technology/Technology Tools

Hardware and software resources that assist the user in acquiring, organizing, and reporting data or other information. Conventionally, and for the most part in this document, the term refers to *information* technology such as computers, networks, and computer software. In a broader sense, the term also applies to a range of audio/visual devices, calculators, and other devices.

Methodologies

Sun Associates, an educational technology consulting firm based in Lowell, MA, has designed a formative evaluation process built around several key principles. These are:

1. Evaluation requires the input of all stakeholders to the activities that are the subject of the evaluation.
2. Evaluation is a reflective process that is designed to highlight current success on the way toward achieving desired outcomes.
3. Evaluation is a data-driven process where a wide variety of data must be collected and analyzed.
4. Meaningful technology evaluation is a holistic process. It is not productive to isolate the impact of technology as a singular "intervention" as technology *alone* does not have direct and meaningful impacts on student achievement. Rather, student and teacher technology use must be examined within the context of a complex range of educational improvements and the system-wide outcomes of all of those improvements.

With these essential design principles, we have created a three-stage process for technology evaluation. This process is summarized in the following diagram and in the following text.

Formative Approach

When considering technology evaluation, we are predominantly concerned with formative versus summative methods. Sun Associates' evaluation projects are of the "how are we doing" versus the "how have we done" variety. We have found this is an important point to make as the general public often expects evaluations to be "tests" that sum up the success or failure of a particular event or occurrence. As most teachers know, technology implementation -- and certainly the larger educational enterprise of which technology is just a small part -- cannot be treated as a

"been there, done that" event. Meaningful assessments take a variety of factors into consideration and transpire over time. Exemplary technology evaluation work incorporates this philosophy by developing broad-based indicators that are measured using quantitative *and* qualitative data.⁴

Data-Driven Process

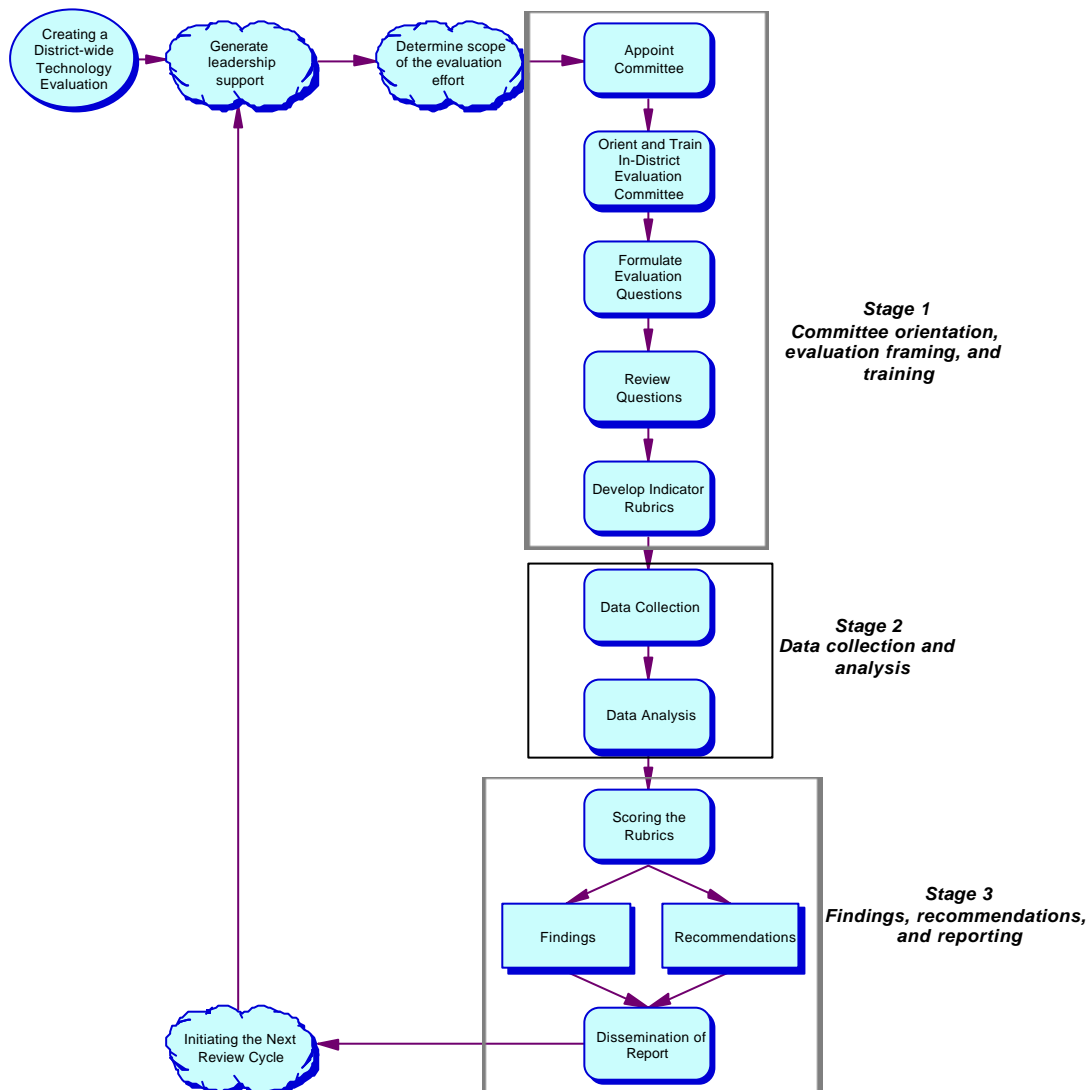
Evaluation is a data-driven process. The basic evaluative process is to collect data that tells a story.⁵ The framework -- or plot -- of this story is determined by the evaluation questions created; but the story itself comes from data. Therefore, in educational technology evaluation, the evaluator's task is to gather data that tell the stories of how technology has impacted student achievement. Data can be quantitative (counts of things) or qualitative (descriptions of things). A well-rounded evaluation will make use of both types of data. It is no more possible to tell the story of technology's impact solely through reporting test scores and computer counts than it is by simply laying out a string of anecdotal stories. Rather, data needs to be deeply descriptive and logically supportive of the questions to which it responds.

Holistic, Authentic Assessment

Most teachers will be familiar with our basic evaluation process, as it is essentially the model for an authentic, performance-based assessment. While such assessments have traditionally been used for student work, we apply this same methodology to assessing the "performance" of a system -- in this case, instructional technology. Developing and deploying a technology evaluation is a considerably larger task than developing a rubric for assessing student projects, but the underlying logic is the same. Furthermore, if we are increasingly able to accept authentic assessments for student work -- the true "product" of our educational system -- then isn't it equally appropriate to employ such assessments for various aspects of that system?

⁴ Sun, 2000.

⁵ Bingham, 1999.



Sun Associates' Evaluation Design Framework

St. Louis's Evaluation Process

St. Louis Public Schools retained the services of Sun Associates to guide and form its initial evaluation efforts. Sun Associates, based in Lowell, MA, is an educational consulting firm specializing in the development and implementation of assessments for educational technology. Staff from Sun Associates worked with the District's Superintendent, Director of Instructional Technology, and Educational Technology Consultant to create a set of evaluation questions pertaining to how St. Louis's students and teachers are impacted by instructional technology. This work transpired in meetings held during the Summer and early Fall of 2001. At the conclusion of this phase of the work, the district had two evaluation questions and related performance rubrics (see below).

In addition to the creation of questions and rubrics, the district Superintendent and technology staff formulated a district-wide evaluation committee. This committee was composed of district

teachers, administrators, parents, and a school board member representative of the range of *stakeholders* in St. Louis's educational process.

The Evaluation Committee's work consisted of:

- Reviewing the two formative evaluation questions
- Reviewing benchmarks, or performance indicators, for these evaluation questions
- Reviewing data collection strategies and instruments
- Reviewing district-wide data on technology allocation, use, and impact
- Creating a final report summarizing the evaluation process and year-one findings

Rubrics

Key to this evaluation are the *rubrics* developed by the district technology leadership and reviewed by the district's Technology Evaluation Committee. These rubrics – reproduced in the Appendix of this report and quoted extensively in the following chapters -- organize a set of benchmarks, or performance indicators, that relate to the District's two technology evaluation questions.

Data Collection

It is important to understand that the data collected -- and the rubric scoring -- during this first cycle of St. Louis's evaluation largely exists as *baseline* data. A formative evaluation such as this really works when changes can be observed over time. Naturally then, the first year of the evaluation cannot show change. It can only provide a baseline "snapshot" of where the district is at the time the data is collected.

With this concept of baseline data in mind, our intention during the Fall of 2001 was to collect a broad sample of data on how the district was generally doing in terms of meeting the indicators of success described in St. Louis's evaluation. In future years (see Recommendations for Future Research in Chapter 4), there should be an effort to both collect broad data and to collect data on particular topics of exploration -- many of which have been highlighted via this first year baseline evaluation.

Under the guidance of the Evaluation Committee, and with tools reviewed and approved by the Committee, Sun Associates gathered a variety of data from St. Louis's teachers, administrators, and students during the Fall 2001 semester. Data collection consisted of an online survey, classroom observations across the district, and focus group interviews with a variety of individuals representing different role groups within the district. Using these methods, Sun Associates was able to gather authentic information from close to 70% (n=78) of the faculty in the St. Louis Public Schools.

Online Surveys

The online survey of teacher beliefs, attitudes, and practices related to instructional technology was conducted in October, 2001. The survey was designed for St. Louis faculty members who have instructional roles within the district, i.e. teachers, aides, and librarians. A copy of this

survey and a summary of the data are included in the Appendix of this report (Chapter 5). The survey produced a large amount of useful data, and in particular a considerable number of text comments. 78 people completed the survey – 69% of St. Louis’ faculty (teachers and para-professionals). A number of the respondents included text comments to expand on district technology issues or to address specific concerns not covered in the survey.

Overall, the online survey was intended to provide a broad picture of trends in teacher and student technology use across the district which could then be verified and refined through in-school observations and interviews with teachers, administrators, and technical assistance providers.

St. Louis also created an online survey using the HPRTEC *Profiler* tool.⁶ The questions associated with this survey are listed in the Appendix and plots of the survey responses are shown in Chapter 3. The questions developed for St. Louis’s Profiler survey mostly relate to ascertaining teacher skills in “how to” aspects of technology use. There are several questions that do ask about more integrated approaches to technology.

Classroom Observations

During the week of October 15th, Sun Associates evaluators visited all four St. Louis schools, observing 45 classrooms (14 elementary, 17 middle school, and 12 high school) and speaking with teachers at the elementary, middle, and high school levels. A copy of our observation protocol and a summary of our observations are included in the Appendix.

During the observations, we did not make an effort to observe only those classrooms where technology was currently in use. Rather, our objective was to take a sample, or a figurative snapshot, of how technology might be employed by teachers and students in a "typical" day. In some cases, the principal, librarian, or lab aide directed us to classrooms or labs where a particular technology-infused activity was taking place. Where there were such instances, we observed and recorded our impressions. Most often we simply walked through the school and went into randomly chosen classrooms. During these observations, we paid particular attention to the instructional style of the teacher, the type of classroom organization in place, and the positioning or use of any technology devices found in the room. We also made an effort to speak to teachers to gather information on how they typically used technology, regardless of whether or not we were actually able to view that use.

Finally, in each school we made particular efforts to observe how the computer lab(s) were used, and to observe a class of students working in the lab. We spoke to the classroom teacher and/or computer lab aide whose students were using the lab and gathered information on how this lab use fit within the students' educational experience.

Focus Group Interviews

During the week of October 15th, Sun Associates conducted 3 group interviews, also known as focus groups. During these sessions, we met with elementary teachers; middle and high school teachers; and a group of building administrators. In total, we interviewed approximately 25 individuals. Each interview lasted approximately 90 minutes, using a pre-developed set of

⁶ HPRTEC, 2002, see profiler.hprtec.org/

interview questions. The questions and summaries for each group are included in the Appendix. Focus groups were intended to gather in-depth information on attitudes and opinions specific to technology use, professional development, and policies. Focus group questions were keyed to aspects of the indicators developed by the district evaluation committee.

2

Technology's Impact on Students

Using the process detailed in [Chapter 1](#), St. Louis's technology evaluation committee developed the following evaluation question relating to technology's impact on teachers and teacher behavior:

Do St. Louis Public School students effectively use instructional technology to enhance their learning and support proficiency in the state standards and benchmarks?

In collecting and analyzing data to support the assessment of this facet of St. Louis's technology implementation effort, the evaluation committee considered several key aspects of technology's impact on students. These were:

- Students use technology for **engaged, student-centered, learning**
- Students use technology to support **collaborative, project-based, learning**
- Student use of technology is assessed as an integral part of learning activities that are tied to **core curriculum standards and benchmarks**
- Students use technology to create **portfolios**

As previously noted, the evaluation approach taken by St. Louis emphasizes the involvement of the district evaluation committee in designing an evaluation framework that focuses on those aspects of a given issue which have the most meaning and relevance for the district (as represented by the stakeholders on the evaluation committee).

Before using the district's rubric to assess overall performance in their Student Impact area, we will summarize the data collected on each of the four aspects of Student Impact as identified by the district's evaluation committee. Detailed data (e.g., responses to related focus group questions) is provided in the [Appendix](#).

Student-Centered and Project-Based Learning

Across all grade levels the teachers we interviewed and the classrooms we observed showed little evidence of technology's support of a student-centered, collaborative, project-based learning environment. For the most part, we find that St. Louis students use technology as a productivity tool for their work in traditionally organized classrooms. Often, teachers noted that technology was very helpful in addressing the needs of students who learned at different paces. In this section, we'll investigate both of these strands.

Prevalent Student Uses

At the elementary level, teachers reported that students primarily use classroom computers for skill reinforcement programs, word processing, Internet research (sometimes partnering with another student), free time fun and CD ROM encyclopedia research. While that is the case in many classrooms, there is evidence that in a few classrooms, as one teacher stated, the computer is

"off limits to students." It was noted that some teachers themselves are not comfortable with the available computer technology and thus their students do not use it either.

We observed elementary students using the *Wasatch program*, math drills, word-processing, *Accelerated Reader*, multimedia encyclopedias, keyboarding software, and the Internet. We were told, and our observations bear this out, that the most common uses of technology by elementary students are word processing and skill reinforcement.

At the middle and high school level, teachers report that students will typically use the labs for word processing, Internet research, entertainment before and after school, and business (accounting) software. They may also do keyboarding, *Excel*, *PowerPoint* and use graphics in various applications. The art program at the high school uses the Internet for world museum tours. In the classroom, teachers may have one student or small groups of students do Internet research. One teacher commented that it was difficult to do anything with the classroom computer since there is only one.

The most common use in the middle school lab is the introduction to various programs and skills in word processing, *Excel*, and the Internet. High School teachers state that word-processing, Internet research and graphic retrieval are the most common applications/uses of technology among their students.

Identified Impact

Elementary teachers reported that technology has impacted their students' learning in various ways. In particular, students seem more excited about information being studied and willing to dig deeper using the computer as a research tool. These teachers view technology as extra avenue of learning that offers something a little different. Teachers state that students are more motivated, engaged, and proud of the end results when they are computer generated. Skill reinforcement programs may be viewed by some students as a reward. Another impact includes the availability of new and up-to-date exciting Internet information. Lastly, almost all students find success with computers where they may not feel that way about other classroom topics.

Middle and high school teachers commented on the benefit of how technology has facilitated information retrieval and that this makes research more motivating and enjoyable. These teachers felt that the final product of using a computer and the various peripherals is "more fancy" thus instilling pride in the author. Notably, teachers at this level felt that they now (after introducing technology into the student work process) witness more cooperation and a trip to the computer lab is almost always met with student enthusiasm.

Differentiated Instruction

The majority of teachers at all levels report that technology *does* support differentiated instruction; but this is largely defined as addressing the needs of those students who work more slowly or who have more trouble concentrating on a subject. For example, high school teachers spoke of their students using word processors in a writing assignment. Slower students can go back over their

work while faster students can move on to another activity, freeing up wait time. It allows students to work at their own pace and level.

We found that St. Louis teachers largely define technology's support of "individualized learning" and "differentiated instruction" as products of the pacing of drill and practice software (e.g., the software allows students to move through the lessons at an individual pace). There seems to be little understanding of how technology tools can be integrated within non-technology-based curriculum (see also the findings related to curriculum, below) to support varying student learning styles and multiple intelligences. Regarding this last point, our research makes it very clear that St. Louis teachers *do not have* an understanding of technology as a tool for addressing different student learning styles or multiple intelligences. In our focus groups and interviews we were repeatedly told that technology "motivates" students to perform assigned tasks, and in this way teachers felt that technology was being used to reach more difficult to reach (i.e., "different") students. Teachers did not have anything to say about technology being used as a tool to modify the learning environment to reach a fuller range of students.

Student Direction and Ownership

One of the aspects of a *student-centered* learning environment which effectively integrates technology is the fact that in these environments students take ownership of the choices as to what tools they will use in their knowledge-production activities. Just in terms of technology, this means that students in student-centered environments should exercise a high degree of self-direction in choosing and using technology tools. If St. Louis students were indeed using technology in a student-centered environment, they would clearly be self-directed technology users.

Our research found that most student uses of technology among St. Louis students was highly *teacher-directed*. In the elementary schools, teachers reported that student technology use is almost always ("95% of the time") teacher-directed. A few elementary teachers noted that some students get ideas (for the use of technology) from their parents and subsequently they will bring in technology-created work which they have done at home. Our observations underscored this teacher-reported data. We most commonly saw students working in full-class groups in computer labs versus in small groups or as individuals on an "as needed" basis. In other words, technology use among elementary students is an assigned activity where usually an entire class goes to the lab and works on a common activity as assigned by the teacher.

The data for middle and high school is equivalent to the elementary schools. There is slightly more evidence of upper grade students making independent choices to word process papers (and this is something they might do on their own in a lab or on a home computer), but for the most part technology use among middle and high school students is still "assigned."

Project-Based Learning

In our conversations with teachers and administrators and in our observations in district schools, we did not uncover any examples of technology being used to support project-based learning. We suspect that a few such examples must exist, but that on the whole these are limited to activities in a few classrooms at relatively rare times during the school year.

As we have noted above, technology use by St. Louis students is widespread but limited to productivity and tutorial tasks. While students might (for example) use the WWW extensively to gather information about a particular research topic this is not an example of technology's use to shape and organize investigatory learning in the same way that might occur with a WebQuest⁷ or another experiential/constructivist learning experience.⁸

Pulling It All Together

Across the board, St. Louis students use technology tools to perform traditional instructional tasks – e.g., production of work, skill reinforcement, data collection – within traditionally organized instructional environments. Our data confirms the overall opinion of the Technology Evaluation Committee, and that is that St. Louis students are not working in student-centered classrooms and have relatively little input into the direction of their own learning. While technology could indeed be used as a catalyst for creating a more student-centered environment, this has not yet occurred within the district.

As for overall student impact, our research shows that St. Louis teachers widely believe that technology "motivates" students and adds interest to some learning activities. Further, the administrators we spoke with largely defined student impact in terms of technology making tasks "easier" and "quicker." Again, as with teachers, there seems to be little knowledge among St. Louis's administrators of how technology can truly address learning needs.

Therefore, beyond this basic motivation, teachers and administrators cannot currently identify any specific benefits to technology use. Given the rather limited ways in which teachers currently use and integrate technology, we understand why greater impact is not observed. Still, it should be noted that there is promise that this current situation may change. In our interviews and observations we found that teachers were consistently asking for professional development that addresses these student-learning benefits.

Technology's Link to the Core Curriculum

"Students go to the lab to use software programs that are only sometimes related to what is being done in the classroom".

(Elementary teacher)

At present, St. Louis teachers are systematically working to tie technology skills and activities to the documented district curriculum. True, some high school courses are technology courses (e.g., CAD, and various business education courses) and clearly the technology *is* the curriculum in these courses; but in core curriculum areas such as mathematics, science, language arts, and social studies there are not explicit mappings of technology tools or activities onto the curriculum.

Still, some St. Louis teachers are not using technology in ways that are mindful of curriculum standards. For example, high school Calculus students make extensive use of graphic calculators to master the Calculus curriculum. The High School Calculus teacher is well aware of how he and

⁷ See "Some Thoughts About WebQuests" by Bernie Dodge, one of the creators of the WebQuest concept. This article is available online at edweb.sdsu.edu/courses/edtec596/about_webquests.html

⁸ Curtis, 2001

his students can make effective use of this particular technology. Nevertheless, there is no effort within the district to insure that various technologies (including, but not limited to graphing calculators) are used *throughout* the district's mathematics curriculum. Rather, graphing calculators are used by one teacher because he feels that their use is a good idea and that students learn more effectively when this technology is used. In this type of situation, there is no defined expectation that such ideas for integration go beyond the teacher who originally develops the idea.

In the Recommendations section of this chapter, we will discuss a number of ways in which this situation might be changed.

Electronic Portfolios

Electronic portfolios are not used – at least as envisioned by the district leadership and the Technology Evaluation Committee – within the district. The committee notes that electronic portfolios of student work “...from across a variety of curriculum areas...[and to which] teachers, parents, and administrators have access...for the purpose of assessing student performance” are specified as part of several important state and district initiatives (e.g., Career Pathways).⁹ Nevertheless, district administrators feel that the implementation of such portfolios will require a number of policy additions and changes; and these will take some time to develop and implement.

About as close as the district currently gets to the use of technology for student assessment (and we understand that this is only part of what is embodied in the concept of electronic portfolios) is the *ThinkWave* program. It is important to emphasize that *ThinkWave* is not an electronic portfolio system. ThinkWave is an electronic gradebook which grade 6-12 teachers are required to use. Many elementary teachers use as well. The district's expectation and policy is that all 6-12 teachers will use the “publishing” feature of the program and therefore make student grade data available to authorized users over the WWW. Still, we found in our interviews and observations that this policy is not clear to all middle and high school teachers and that a number of teachers are in fact not publishing (or for that matter, some do not use the program at all even in its off-line format).

Thus, the district's teachers are still some way from using technology to distribute even the most basic (grades) student assessment data. There seem to be problems related to communication of expectations, technology infrastructure, and teacher training that stand in the way of ThinkWave implementation. Given this, we would expect that the district is even further from implementing the considerably more complex assessment that is an electronic portfolio.

Scoring the Student Impact Rubric

Through reflection upon the data gathered and presented in our evaluation, the St. Louis technology evaluation committee has scored district performance at "Level 2" of the Impact on Teaching rubric. Level 2 is described in the rubric as:

Students across the district use technology tools as a way of producing final work products. It only replicates what students would do traditionally without the availability of

⁹ See “Level 4” in the Student Impact rubric

technology tools or resources. Students seldom use technology as a tool for collaboration. Technology use is often seen as an “add on” to traditional learning activities.

Technology use is almost always assigned by teachers. Students seldom make personal choices to use technology within their learning activities. Technology use is often perceived of as an end in itself and not tied to real-world problems or situations. While students are “motivated” to use technology, it does not appear that there is any connection between this motivation and curriculum-based learning.

Some classrooms are organized in a student-centered manner, although these tend to be found in isolated pockets and grade levels. Most teachers still teach in teacher-focused classrooms.

The committee assigned a Level 2 score for the following primary reasons:

- Classrooms across the district are not student-centered learning environments. Most technology use occurs in labs and (particularly in the lower grades) is highly teacher directed.
- There is not a broad-based (e.g., apparent at each grade and in each subject area) expectation as to how students will use technology to support their learning. Most commonly, technology is used as a tool for word processing.
- There is no evidence that the district utilizes, nor is close to developing, a system for creating electronic portfolios as a way of assessing student performance.

Considering the data, the committee felt that in order to reach a “Level 3” the district would need improve on the following fronts:

Communication

It was strongly felt by the Committee that if teachers were to develop the behaviors and achieve the level of performance described both in these rubrics and in what is accepted by the educational field as good practice, then the expectations for this level of performance need to be broadly and effectively communicated to the district. This communication must reach teachers, parents, students, and the St. Louis community. At present, this is by no means the case.

Examples and Alignments

Very much in line with the suggested improvement in communication, the Committee felt that one thing that needs communication is actual examples of actual student rubrics/expectations for the use of technology by grade and subject area. In short, St. Louis teachers need usable exemplars for effective technology integration. Further, these exemplars need to be tied to curricular goals and objectives for each grade level. Benchmarks need to be established for student technology use at each grade and perhaps subject. The Committee felt that there would be merit in the district’s examination of a national set of standards such as the ISTE NET-S.¹⁰

Support

The Committee felt that in order to implement technology standards, St. Louis teachers need considerably more assistance and support in classroom technology integration. This support was determined to go beyond “technical support” (e.g., “help with the wires”). Rather, the Committee suggested that the district provide actual curricular integration support to teachers at all grade levels (perhaps subject areas in the High School).

Portfolios

Since electronic portfolios truly do not exist at the present time, the Committee felt that some sort of development would have to occur if the district were to achieve any progress in this aspect of its technology program. It was noted that there are a lot of management and policy issues that need to be worked out (e.g., what goes in, who gets to see, where do you store them, how is it disposed of, etc.)

Infrastructure

Teachers across the district – but particularly at the elementary level – note the need for more lab time. Lab time is so tight now that teachers need to sign up two weeks in advance. This amount of advance scheduling is often impractical. Teachers need access to computer labs close to when the need arises in their curriculum. This fact results in the committee noting that perhaps it’s time to revisit the allocation of resources to the classroom. There are a lot of lower cost peripherals that

¹⁰ ISTE, 2000

can be used in the classroom that can take the burden off the labs, leaving only the more intensive work to occur in the labs.

We should note that our research found (with few exceptions) little if any student use of information technology outside of school computer labs. At the time of our observations, classrooms displayed little or no student work product that had been created with technology tools. Therefore, until the district either revisits its dedication to labs *or* teachers become more comfortable using their classroom computers for student activities, more lab time/space is surely needed.

Sun Associates' Interpretations

Our interpretation of the district's Student Impact rubric is that a major difference between Levels 2 and 3 is primarily in terms how teachers view technology and how students utilize technology within the context of their curriculum. In order to move to the next performance level (Level 3), *teachers* will need to develop an understanding of how technology can be truly integrated into their curriculum and instructional environment. Without the building of this teacher knowledge, students will continue to use technology tools in the mechanical and un-focused (at least not focused on learning objectives) ways we currently find.

A similar relationship exists around the use of technology for student assessment (portfolios). Level 3 of St. Louis's rubric emphasizes the development of these portfolios, whereas performance in Level 2 assumes that the use of electronic portfolios is slim to nonexistent. It obvious that students will not have portfolios until *teachers* and administrators develop the policies, guidelines, infrastructure, and expectations for portfolio use.

Finally, Level 3 performance unequivocally calls for student-centered learning environments. Students do not create these environments by themselves. Rather, the creation of learning environments is the responsibility of *teachers*, administrators, and the entire St. Louis community. Such environments are in fact behind the bulk of most educational reforms, not just technology integration. In this way, effective technology use becomes an indicator of a district's commitment to, and success in, a much broader range of reform issues. This statement is not intended to avert the emphasis of this evaluation from technology, but instead simply points to the widely accepted belief among educators that technology and technology use is not an end within itself. Technology is just a part of a bigger picture, and students cannot be expected to "effectively" use technology unless there are a number of other – more basic structural – supports such as reformed instructional environments first in place.

In keeping with the connection established between student impact and teacher skill, the next chapter of our report will provide direct insight into how St. Louis *teachers* are using technology tools within their educational environment. After presenting those findings, and the district's score on the teacher impact rubric, we will (in [Chapter 4](#)) further investigate the link between students, teachers, and technology.

3

Technology's Impact on Teachers

Using the process detailed in the Methodology section of this report, St. Louis's evaluation committee developed a central, summarizing evaluation question relating to technology's impact on student achievement. Quite simply, the committee asked:

*Does St. Louis Public Schools provide adequate support and appropriate professional development resources for its **teachers** to effectively use technology to positively impact student achievement aligned with district goals and expectations?*

In collecting and analyzing data to support the assessment of this facet of St. Louis's technology implementation effort, the committee considered several key aspects of technology's impact on teachers. These were:

- Teachers understand a **connection between integrated technology and student achievement**
- Teachers use technology as a **tool for professional efficiency**
- Teachers have ready access to a wide range of useful **technology professional development**
- Teachers have been provided by the district with **clear expectations** for their use and integration of technology

As in the previous chapter, before applying the district's rubric to assess overall performance on their Teacher Impact rubric, we will summarize the data collected on each of the four aspects of Teacher Impact as identified by the evaluation committee. Detailed data is provided in the Appendix.

Connecting Technology with Student Achievement

We spend a lot of time and money (on technology) and haven't seen a significant increase in learning in specific areas."

(An Administrator)

As detailed in the previous chapter (Student Impact, Chapter 2), we found little evidence that St. Louis teachers and administrators make a connection between student technology use and increased student achievement. While the use of technology tools is prevalent among students and teachers, we did not find that teachers had knowledge of "...how these skills can be integrated into the classroom environment for improved student achievement."¹¹

When elementary teachers we spoke to were asked about "interesting or intriguing uses of technology," multimedia presentations with software such as *PowerPoint* or *Hyperstudio* were mentioned. Others teachers referred to seeing examples of students publishing and printing their own books and e-books. Still other teachers highlighted the ability of educators to make their own homework packets and templates for flashcards. Finally, some wanted to know how to download images from the Internet.

¹¹ See "Basic Indicator" in the Teacher Use rubric

The elementary teachers felt that technology has improved their teaching in many ways. First, they felt more informed through the Internet. They stated that when information is more readily available they are in turn more motivated to do research. It was also mentioned that the Internet also has numerous lesson plans available, thereby giving them the ability to be more “creative.” These teachers felt that computers in their classroom are “fun” and the enthusiasm they feel around ready access to information rubs off on their students. If they create worksheets and reports for students, technology makes the papers look more engaging. Email makes it easier to communicate with parents. Some mentioned that the ability to bring the world to their students makes them feel like more effective teaching professionals.

When asked if they could think of ways that technology has enabled them to do things that they could not have done otherwise the teachers again mentioned the vast amount of possibilities delivered via the Internet. For example, they mentioned that students can look at museums around the world and information is retrieved quickly. Many professional links are available to them for connecting with other teaching professionals. Allowing students to correspond with other students via e-mail is significant for collaborative projects. The ability to digitize pictures and see them instantly on the computer is an improvement from having to have film processed. At the Middle and High School level, very similar benefits to those listed by Elementary teachers were reported. Middle and High School teachers reported that technology being used for motivation, research, and communication.

Aside from increasing motivation and perhaps offering a broader range of resources (via the WWW), the teachers we spoke with during our data collection work reported few connections between technology, technology skills, and improved student achievement. Since, as we discussed in the previous chapter, St. Louis teachers do not draw a deep connection between technology and its use to address diverse learning styles we have to say that the district’s teachers are not consciously using technology to improve student achievement.

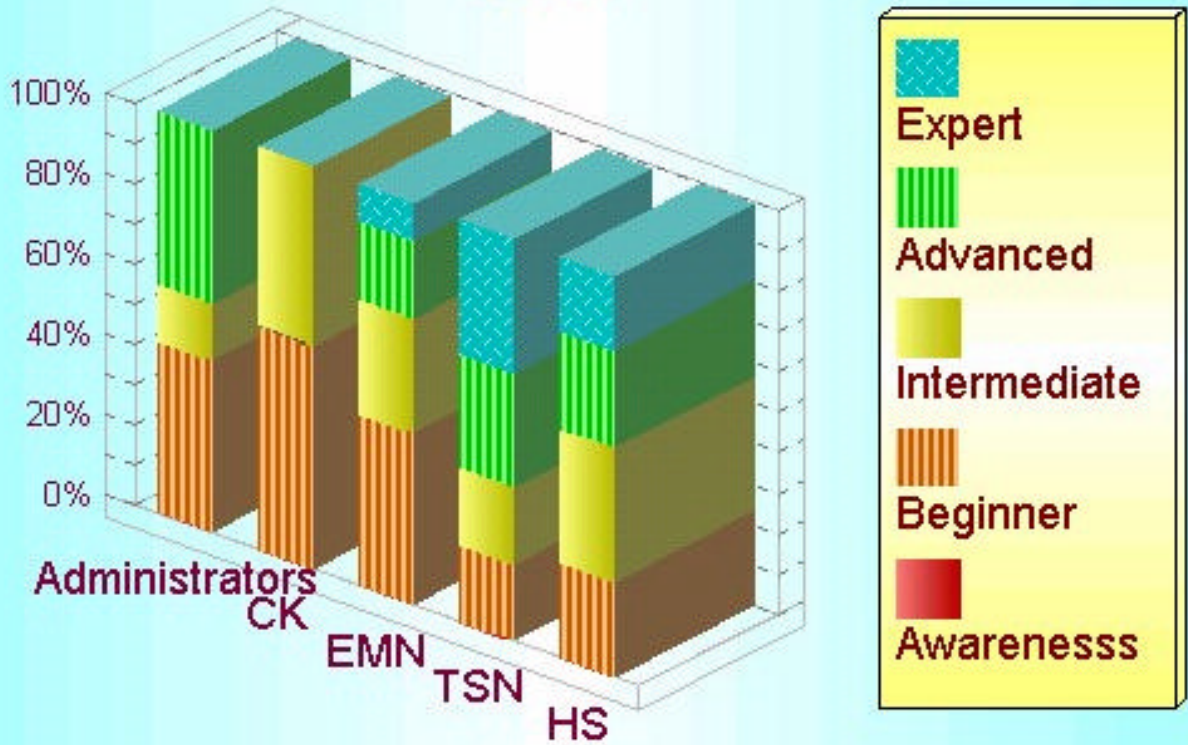
Professional Efficiency

In terms of what we found teachers using technology tools, we found that teacher technology use mirrors that which they expect of students. That is, we found that most teachers used word processors for creating materials and correspondence. There was evidence that teachers at all levels (particularly 6-12) use the *ThinkWave* program to record student grades and attendance. We also found that most teachers are familiar with how to access the Internet (WWW, specifically) and most if not all teachers are proficient users of electronic mail.

As the following figure shows, the district’s 2001 school year *Profiler* assessment data indicates that a large percentage of staff in most schools are at the “expert” to “intermediate” level of technology proficiency. The actual questions behind this survey are found in the Appendix of this report. Only at Carrie Knause does one find more than 50% of teachers at the lowest, or “beginner,” level.¹²

¹² There are so few teachers at Carrie Knause that this data is relatively meaningless

Staff Tech Assessment 2001



Nevertheless, as the scatter plots (following figure) of responses to individual questions show, across the district teachers responded that they were “experts” in “system” tasks whereas they were at considerably lower levels of proficiency for “integration” and “interaction” tasks. System tasks include things such as basic computer operations (turning on, shutting off, accessing help documentation, etc.). Integration tasks relate to actually using the computer and related software and network tools in curriculum-oriented learning situations. So once again, our basic evaluation findings are confirmed. St. Louis teachers know how many of the mechanical operations of their hardware (less so their software), but are relatively un-aware of how to actually use this technology as a tool for learning.



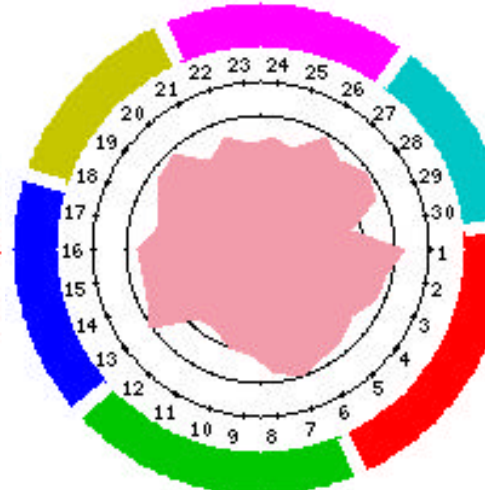
CK Elementary
Score: 42.8%N=9



St. Louis High School
Score: 55.8%N=27



EMN Elementary
Score: 46.8%N=23



TSN Middle School
Score: 63.4%N=23

St. Louis Public Schools Profiler Data for 2001 (by school)

Questions 1 – 6 = System; 7 – 12 = Software; 13 – 17 = Internet; 18 – 21 = Peripherals; 22 – 26 = Integration; and 27 – 30 = Interaction¹³

Strictly in terms of “professional efficiency,” St. Louis’s teachers ability to fulfill this objective depends on the definition of the term. If the term is defined to mean a teacher’s ability to use technology to create materials, keep records, and correspond, then St. Louis teachers would by our research seem to be doing rather well. We have indeed found – and this is born out by the Profiler data as well – that the district’s teachers can use basic technology tools for completing many of the procedural tasks associated with their jobs.

If on the other hand professional efficiency is defined to mean efficiency in connecting with – educating – students, then we would consider this “integration.” As we have discussed, we do not

¹³ The questions (1 – 30) associated with St. Louis’s Profiler survey can be found in the Appendix of this report.

believe that St. Louis teachers have a strong, operational, understanding of what it means to integrate technology.

Scoring the Teacher Impact Rubric

Upon their reflection on the data collected during this evaluation process, as well as through their own individual experience with the district, the members of the Technology Evaluation Committee scored the district as a Level 2 in its Teacher Impact rubric. This level is defined as:

Most teachers have minimum technology skills related to basic computer applications (e.g., email, word processor, WWW). The district is in the process of creating and adopting a set of teacher standards and expectations which map technology skills to professional productivity and curriculum-based learning activities. The district has developed a process for the sharing of technology skills arising from technology professional development, but teachers are not actively participating in this process.

The committee arrived at this score for the following primary reasons:

- The district has only just started to think about developing teacher expectations, and a full development of documented expectations is some ways off into the future.
- Most technology professional development is still “how to” and is not related to curriculum integration.
- There is significant doubt (among committee members) that the district has actually developed a process for “sharing” the technology skills that arise from technology professional development.

Particularly due to this last finding, the committee felt that actual district performance may in some ways be closer to a Level 1 than 2. On the other hand, district performance in terms of the number of teachers scoring “expert” or “advanced” on the Profiler approached Level 3 performance. Thus, in balance, the committee decided on Level 2.

In order to solidly reach Level 3 performance, the committee felt that the following changes would need to occur:

Improved Communication

The district needs to do a much better job of first developing, and then communicating its expectations for how teachers are to use technology within their instructional environments. The committee felt that it would be wise to consider adopting a set of standards based on the national NETS-T (teachers) and NETS-S (students) standards.

Furthermore, the committee – and the teachers we spoke with in our research – felt that the district needed to improve its overall communication surrounding all issues of technology. There were major concerns raised related to how teachers communicate (or don’t) with technical staff. Also, several teachers noted that they wanted to have technical staff who had greater understanding of the teaching and learning issues confronting teachers. These expressed concern that a computer

professional with no teaching background is giving them ideas that aren't feasible in the classroom.

More Professional Development

Clearly the district needs to offer more professional development of the type (if not the specific pull-out model) represented by the Fall 2001 I3 training. This need was identified by both the Evaluation Committee as well as the teachers we spoke with across the district.

More Integration Support

The committee echoed the need (as stated by teachers) for someone with a strong curriculum *and* technology background to be hired into an Instructional Support position. Further, the committee felt that there should be one such position at each level (elementary, middle, and high school).

More Technical Support

Aside from Integration Support, the committee also felt the need to have additional technicians, or to "Hire Matt full time." It is our understanding that this has already been done.

More Instructional Support to Students

The committee also recommended that the district hire a certified teacher to work with *students* and technology at each grade level. In essence, the committee recommended hiring computer teachers.

We should note that while such positions would indeed jump-start the process of integrating technology within the curriculum (particularly at the elementary and middle school levels), we do not favor such an approach over one which emphasizes more professional development and the hiring of integration support staff to work *with teachers* (see our recommendations in Chapter 4).

Sun Associates' Interpretations

We concur with the committee's finding that the district is at Level 2 performance in its Teacher Impact rubric (with strong leanings both to Level 1 and Level 3).

Of all the data reviewed which supports this finding, we believe that the lack of documented and communicated expectations for teacher use is what is most responsible for the current level of performance. We find that St. Louis has followed a rather common historical path in its educational technology effort. That is, the district has focused on infrastructure and its technology effort has been lead by staff who have had infrastructure development and maintenance as their primary objectives/responsibilities. Often, this sort of history reflects a hopeful "build it, and they will come" philosophy for technology integration. In other words, districts build technology infrastructures with the hope that teachers will simply begin to "integrate" technology once they learn "how to" use the hardware and software applications.

The fact is, as we discussed in the previous chapter, technology integration is but one part of an overall shift to new outlooks on (and practices in) teaching and learning. Just as the ownership of a new car does nothing to teach a person to drive, simply having technology tools does nothing in terms of helping teachers use these tools in ways that truly revolutionize teaching and learning.

Technology can be a powerful catalyst, and at least an aid, to creating reformed instructional environments; but since the pathway from tool to practice is anything but clear to teachers steeped in years of traditional practice and methods, *professional development* is required to help teachers transition from the old to the new. Further, this professional development must be tied to clear *standards* for how a district wants its teachers to work. These standards need to be illustrated with clear, concise, *models*. All of this is wrapped around the notion of benchmarks and expectations. While technology standards might be only a small part of an overall reform package, they are still critical if teachers are to learn specifically how to use technology within the broader picture of reform.

At present, St. Louis is at an early stage of development in its efforts to create standards, provide professional development, and support teachers in the use of technology. The rubrics developed through this evaluation effort are a strong step forward in this development process.

School districts are complex organizations. Evaluation efforts that look at particular facets of school districts are bound to be as complex as the districts themselves. Therefore it is not surprising that our evaluation of St. Louis's educational technology ends up raising as many questions as it answers. Still, if we return to several of the original purposes of this evaluation, we believe that this effort has made several significant accomplishments.

- Through the work of the district evaluation committee and their development of performance indicators, St. Louis has initiated a process of *reflection* relating to expectations for educational technology and its value in the educational environment. This reflection has wide implications for teaching practices and attitudes, professional development, and curriculum.
- By establishing specific indicators, the district has established a framework for holding technology, district processes, and the users of technology *accountable* for specific levels of performance.
- Data collected during this initial year of performance assessment has established certain baselines. These baseline findings are the foundation for immediate recommendations/actions and can serve to benchmark growth in the future.

All of these benefits are exactly in line with the purposes of a formative evaluation effort. The greatest value arising from the current evaluation is how this work can be used in the future.

Summary of Sun Associates' Findings

While most of our findings have been expressed in the previous two chapters, we feel that it would be useful to summarize them again before moving into our specific recommendations.

Categorically, we find:

Infrastructure

1. At present, the district seems to have a sufficient quantity of up-to-date computer workstations. There is some concern expressed by teachers about the lack of 3.5" drives on the new Compaq machines. This situation could be addressed through some training on how to access network resources; the purchase of a few inexpensive USB floppy drives (several per lab would suffice); and a configuration of the district's network which encourages users to store documents on networked servers (e.g., in class and/or student folders) versus on floppy disks.
2. At present, the physical local area network within each school seems sufficiently extensive. We do find that the network lacks a sufficient number of hubs to fully activate the

available data ports, but this is a relatively minor problem that can be addressed in the district's network expansion plans. There are sufficient classroom drops to serve the present number of workstations.

3. Across the district, computer use is designed to occur in computer labs. Classroom computers are generally located too close to the teacher's desk for access by students. This effectively eliminates classroom computers for middle school and high school students. It is possible that the district will want to re-think the current strategy of computer allocation (which favors labs over classrooms) as more and more teachers learn how to integrate technology *in their classrooms*.
4. At least at the elementary level, there are staff concerns about the reliability of hardware and the network. Teachers cited lack of reliability as a key reason for *not* using technology within their instructional environment.
5. Software is mostly of the tutorial and productivity type. There is little or no evidence of any simulation or exploratory software. There also needs to be better communication of the policy and procedures for choosing and acquiring software. We found that teachers at all levels (particularly the elementary) were dissatisfied with the current policy (at least as they understand it).

Professional Development

1. Teachers and administrators did not identify any specific professional development offered to teachers other than that associated with recent efforts to move all 6 -12 teachers to the use of *ThinkWave*. It should also be noted that I3 training was not mentioned by the teachers we interviewed as it occurred after our data collection effort.
2. Teachers have an interest in technology professional development that maps to how technology can be used to enhance and impact student achievement (versus basic "how to" training). Much of the current professional development seems to have related to productivity versus student-learning uses of technology.
3. Teachers ask that professional development be more job-embedded (our term), or integrated within their daily work. They state that the district's current model for professional development takes too much time away from their classrooms and undermines their teaching work.

Teacher Fluency

1. Administrators feel that their teachers are "moderately" proficient in the use of technology for professional/personal productivity (e.g., word processing).
2. Teachers across the district routinely use technology for word processing handouts, tests, and various materials to distribute to students. We found many teachers who routinely use email and access the WWW for "searching." Nevertheless, there seems to be very little

knowledge about how any of these skills might be used *educationally* in the classroom or with students.

3. There is a large amount of teacher awareness of, and interest in, the Internet. There seems to be little knowledge of how to integrate the Internet with their curriculum.

Recommendations

In light of our findings, and the scores on the district's two rubrics, we offer the following recommendations as to how St. Louis can move forward from its current level of performance.

A Planful Approach

First and foremost, the district must adopt a strategic approach to implementing technology as a key tool for teaching and learning. At present, the district has a reasonably strong set of technology goals in its 2001 Technology Plan. These are:

- Technology will have a direct involvement in the learning process for students
- Technology will be incorporated into the district business operations and the management of student information
- We will support staff development in technology and create benchmarks for teacher proficiency
- We will do everything reasonable to control proper use of district technology
- We will establish a process and procedure to review all technology and software requests
- We will assess and utilize established benchmarks for students at each grade level

These goals have been reaffirmed and somewhat expanded in the Board's latest annual report.¹⁴ Particularly, the new goals emphasize the creation of *teacher standards for technology literacy* and the creation of *student benchmarks*.

We applaud these goals, and urge the district to create the necessary action plans to implement their goals. At present, we find the district high on intent, but lacking in action. A truly planful approach to reaching its technology goals would involve:

- Specific *action plans* for the implementation of goals. These plans should be detailed as to timing (i.e., when certain actions will occur), responsible individuals, and benchmarks/indicators of success/progress.
- Creation of a *budget* for technology implementation that includes identified sources of funding for technology staffing, professional development, and infrastructure development/maintenance.
- Broad stakeholder participation in the planning and implementation process. The plan cannot be the sole responsibility of a single (or small number of) individuals.

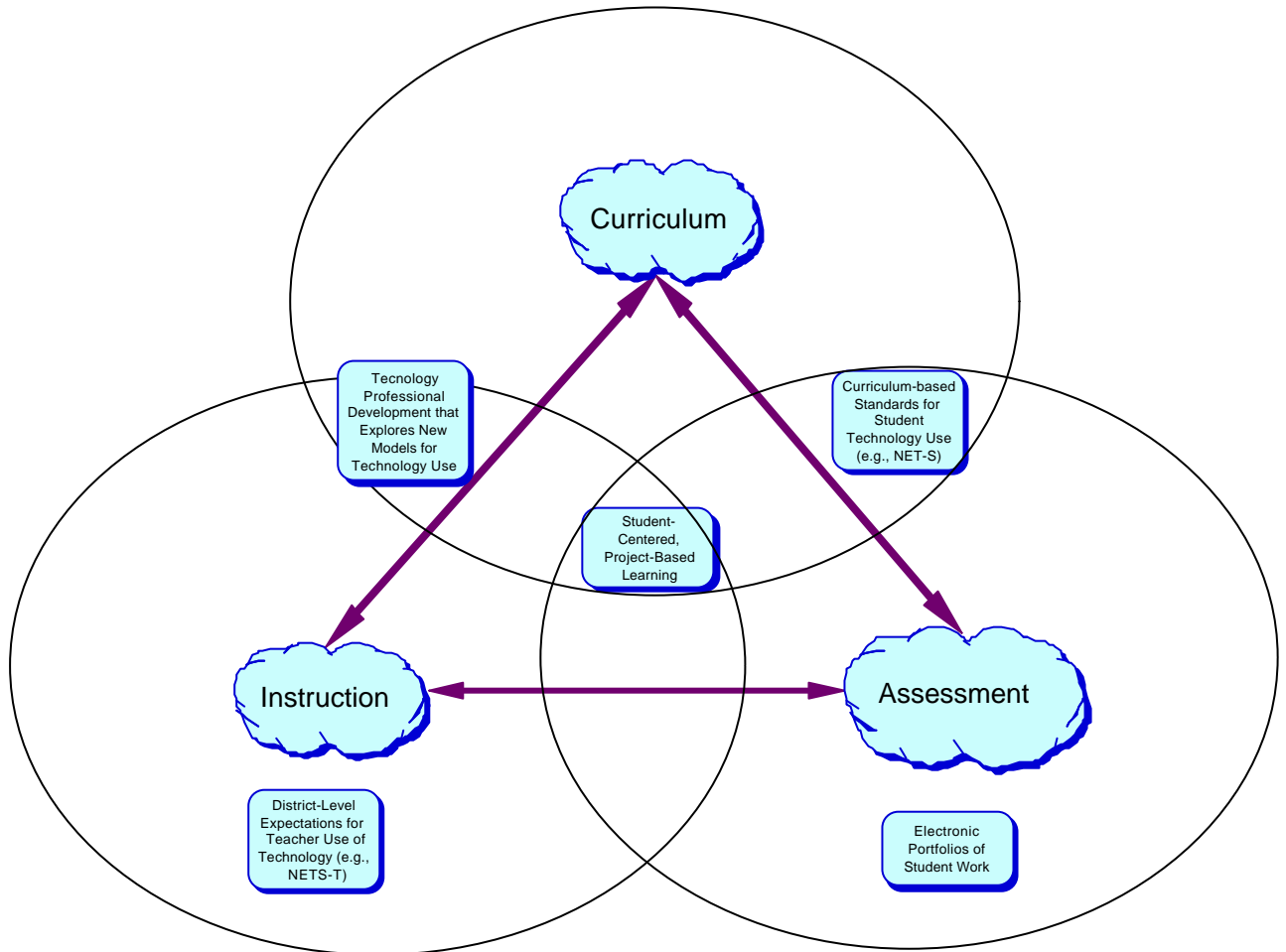
Many of our remaining recommendations follow suit from an effective technology plan and an effective process for creating such a plan.

Adopt Benchmarks

¹⁴ See "1999-2000 Annual Report" of St. Louis Public Schools

Benchmarks, or documented and assessable expectations for teacher and student technology use, are critical for the effective integration of technology within the teaching and learning environment.

The following figure shows how we schematically understand student/teacher benchmarks (and other key technology-related educational initiatives) to fit into this overall picture.



Clearly then, benchmarks are just one part of a larger effort to support and change the district’s understanding of how technology can be used to support teaching and learning. Benchmarks should be designed to serve as guideposts as St. Louis’s teachers navigate a complex process of change.

Design and Offer Effective Professional Development

As the figure above illustrates, and as we have noted elsewhere in this report, teachers need professional development in order to transition from “where they are” to “where you want them to be” in terms of their ability to integrate technology. This means that you must create successful professional development models.

It goes beyond the scope of this report to recommend specific professional development models. A number of resources listed in the [Bibliography](#) offer suggestions for technology professional development. Also, our [Planning into Practice](#) resource guide has an entire chapter on professional development design.¹⁵ Still, here are some suggestions for strategies that can positively impact St. Louis's future technology professional development.

- **Have the technology that the staff is being trained on available immediately.**
Nothing will cause your technology professional development program to lose its credibility quicker than teachers not having immediate access to the same technology in their classroom. Why should they spend valuable time (and get their hopes up) with training if the classrooms don't have the same equipment or software? While unforeseen delays and scheduling can disrupt careful planning for coordinating hardware/software delivery and professional development, it always helps to have workable alternatives to manage a situation like this.
- **Offer incentives for participation.**
The best incentive for participation in technology workshops is access to technology. That means, teachers will be given computers or other hardware and software incentives for their classrooms if they attend professional development sessions. We have seen great successes when districts tie workshop attendance to the opportunity to use technology. In effect, this makes technology a privilege, not a "right." The privilege is earned through participation in professional development and a willingness to collaborate with staff developers in future efforts. Other incentives such as stipends or recertification requirements can also help motivate people to come to training, but they do not guarantee that the attendees are really interested.
- **Require participants to engage in follow-up activities.**
Teachers should not be allowed to just come to planned activities, receive their training and then return to their classrooms without sharing their knowledge. Rather, participants need to agree to engage in activities such as mentoring, model teaching, and/or serving as trainers in upcoming workshops. This extra effort might be rewarded through stipends, more technology rewards, release time, or salary credits.
- **Offer more than "keyboard" sessions.**
Be sure to include sessions that are about writing and planning curriculum and other topics - and not just sitting and working at a keyboard. Remember that the keyboard is intimidating to some teachers, and they will not be inclined to sit in workshop after workshop where they are performing uncomfortable and alien tasks. Rather, make your professional development sessions a combination of reinforcing "what we know" and learning new things. Our experience is that the "non-hands-on" technology workshop will be jarring at first to some teachers as it runs counter to their expectations of what a technology workshop should be. Nevertheless, you need to take the time - non-keyboard time - to contextualize technology use.
- **Provide time for "out of class" practice and always provide handouts.**
Once again, many teachers learn best when they can practice new skills on their own...perhaps even at home on their personal computers. You cannot expect people to master technology solely within the computer lab and often the best learning occurs in private on the classroom

¹⁵ Sun, 2000

computer just after dismissal or during a planning period. To support this independent learning, be sure to provide step-by-step instructions and handouts for *every* new application or topic you cover.

Always provide actual examples of ways in which the subject technology can be used within the curriculum. Even if time does not allow a through exploration of the examples during workshop time, make sure that every participant leaves with additional reading.

- **Use experienced trainers.**

Just as good teachers serve as facilitators of knowledge development for their students, teachers themselves need good facilitators for their own development. Workshop facilitators should have a classroom background or at least have experience with teachers and the teaching environment. The appropriate trainer/facilitator will be able to communicate with teacher participants about how the subject technology is actually used in the classroom. In our experience, this contextual experience is *equally* important to technical knowledge. The same trainer who might do an excellent job teaching insurance agents to use spreadsheets might be absolutely worthless trying to teach teachers to use spreadsheets.

- **When grouping workshop participants, make sure that the group has a common “reason for being” that does not relate solely to technology.**

Training that takes place in one large workshop is both difficult to manage and ineffective. When you have a large group, you will need to break participants into smaller groups. Different groups will attend different sessions at different times. When grouping participants, it is important to give some thought as to how the groups are constructed.

We have found that the key to successful teacher groups is that the individuals in the groups have a common purpose. Sometimes, that purpose is just to learn the technology tools. We caution you that this is *seldom* a very strong or binding purpose! Identifying a common curriculum concern, curriculum subject area, or grade level will create a stronger bind. When this common purpose is established within a group of participants in a technology professional development event, the group can have a focus that transcends learning about technology.

- **Develop several professional development “strands” and offer them to different groups of participants.**

It can be very frustrating for teachers (or anyone) to feel placed into a one-track, lock step, curriculum. It can be even more frustrating to work with individuals well above or below your current technical ability. Once again, grouping everyone into the same workshop setting is seldom good for anyone. Effective professional development does not work with the “least common denominator” principle.

An alternative is a professional development series with sessions that address different needs, interests, and classes for different ability levels. This does not mean that you need to exponentially increase your total number of professional development offerings. While you may need to offer a few more “basics” sessions (just to get everyone started), later sessions can be offered on a first-come-first-served basis. Everyone will eventually be able to take everything, but by asking people to choose what they want to take and when, you are not only creating an environment of choice (versus mandate) but you are also allowing people the

opportunity to take professional development at their own schedule and pace. The primary benefit will be improved relevancy to participants' own needs.

A perspective on teacher change and technology integration

For further clarification on the issue of why benchmarks and effective professional development are so important, it pays to consider some of the research background on teacher change vis-à-vis adoption of technology as a tool for reformed teaching and learning. Clearly, if St. Louis students are to start using technology in different ways, then their *teachers* must develop new visions on how technology can support student learning. This goes beyond the use of technology as a productivity tool and enters a territory where technology is seen as a way to support fundamental changes in how students interact with information and create/construct knowledge.¹⁶

We believe that it is certainly possible to support these fundamental changes *without* technology and that technology alone cannot -- and should not -- be responsible for fundamentally changing the way students learn. Nevertheless, technology should serve as a tool for implementing fundamentally reformed teacher visions. Further, research shows that technology tools can be a catalyst for helping teachers envision new and more effective ways of managing their classroom environments and the leaning which occurs within.

Apple Computer's Classroom of Tomorrow (ACOT) is a multi-year research project centering around understanding the process steps by which teachers integrate technology tools into their practice.¹⁷ We find it useful to consider the ACOT framework as a way of establishing different levels of teacher experience and for understanding how teachers progress from lower levels to higher levels of technology use.

The ACOT framework is as follows:

Stage	Teacher Behavior
Entry	Teachers learn the "basics" of using new technology.
Adoption	Teachers use new technology to support traditional instructional methods.
Adaptation	Teachers integrate new technology into traditional classroom practice, focusing on increased student productivity and engagement through the use of tools such as word processors, spreadsheets, and graphics tools.
Appropriation	Teachers focus on cooperative, project-based, and interdisciplinary work that incorporates technology as needed and as one of many tools.
Invention	Teachers discover new uses for technology tools often by designing projects that combine multiple technologies.

Adapted from "A Report on 10 Years of ACOT Research" (Apple Computer, 1996)

When documenting actual teacher behavior vis-à-vis technology use, it becomes possible to place this behavior within the ACOT framework. Just as with the evaluation indicators and rubrics developed by St. Louis's evaluation committee, the advantage of such a "framework" is that it

¹⁶ Ravitz, Becker, and Wong, 2000

¹⁷ Apple Computer, 1996

places current teacher behavior in contrast to other ways that teacher behavior might grow beyond its current level.

The ACOT framework is a technology-specific take on a broader body of research related to change, innovation, and adoption. Research on change provides a number of key points when considering how innovations such as technology are introduced to a teacher population, adopted by teachers, and how this adoption process can be managed. Specifically, one should consider that change is highly personal and is made first by individuals, then by institutions. Interventions -- such as professional development -- must be related first to *people*, and then secondly to the innovation itself. In the area of technology, this basically means that technology professional development needs to address the personal concerns of teachers as related to their individual practice. Training that is generic to the technology itself (e.g., applications training across grade and content levels) will not be particularly successful in moving teachers from lower to higher levels of adoption. Finally, change requires developmental growth. It is not possible to leap past or over stages of teacher concern and adoption. Rather, true and lasting change requires supports at all levels.¹⁸

In our experience, most of the problems experienced in a school district that relate to introducing technology innovations are, at their root, problems related to change. When a district addresses its technology problems and provides solutions at the *institutional* level versus at the individual teacher level, there will be problems in realizing success. Likewise, when technology-related change does not account for the fact that different teachers move through a sequence of adoption steps *at their own or individual pace*, then problems will ensue. Therefore, as we consider St. Louis teacher technology use, it will be beneficial to consider how this use fits with research such as the ACOT framework and the broader issue of school change.

On a very practical level, the above-referenced perspective on individuals and change argues for professional development mechanisms which on one hand address varying *individual* levels of concern and on the other hand attempts to move all individuals to an *institutionally* defined level of proficiency. In other words, professional development is standards-based and sensitive to individual needs. In order to create such professional development, the district needs sufficient support/assistance staff and standards. Both of these needs (framed as recommendations) have been discussed earlier in this chapter.

Improve Communications and Trust

As a start toward addressing these communications issues, we would recommend the following:

- The district should establish clear expectations for its technology integration effort (i.e., strategic goals, action plans, and benchmarks) and make sure that all administrators are “on board” with the substance and specific process relating to this effort.
- Building administrators should organize building-based technology committees, and then visibly advocate for these committees at the district level

¹⁸ Loucks-Horsley and Stiegelbauer, 1991

- Administrators at all levels should participate in professional development that relates to instructional uses of technology. This will help establish administrators as instructional leaders as well as administrative leaders.
- Building administrators should be members of a district-wide technology committee. This committee should take responsibility (be given responsibility) for addressing district-wide technology issues – e.g., the current policy regarding how staff arrange for technical support and maintenance.

Augment Existing Technical Support Staff

Research shows that in order for teachers to use technology for these more integrated, higher order purposes, it is essential that the technology tools (infrastructure) be available and well-supported.¹⁹ Simultaneously, teachers must have available a sufficient range of staff development options to support their use of the available technologies. Infrastructure, support, and staff development are all intricately linked as supports for an ultimate goal of utilizing technology as a tool for student achievement.

We recommend that St. Louis hire the equivalent of an additional full-time support technician who is qualified to work on the hardware, software, operating systems, and network environments currently in place throughout the district. These staff could come from a combination of new hiring, reallocation/reassignment of existing positions, and use of RESD resources. The essential element is that the staff be *designated technology support staff* who have technology support as their only job responsibility. We believe -- as do a majority of St. Louis teachers -- that such support is necessary if technology is to be effectively implemented in the district.

It is also worth noting that the district could make greater use of so-called "deputy" support staff such as students, lab aides, community members, and other individuals. The key here is to once again *formalize* the support arrangement so teachers can count on someone to provide technical assistance. For example, many districts across the country have found success with using student interns to provide technical assistance and maintenance (under guidance from a qualified adult staff member). Such programs extend the reach of dedicated technical staff and provide students with valuable technical skills and responsibilities.

Finally, it is key that the technical support staff be limited to working on *technical* support and that teachers know that the district has hired other support to work with instructional issues. Expecting technicians – who will probably have no formal classroom experience or educational training – to work with teachers on instructional issues will unfairly burden the technicians and will dishonor many teachers' feelings of professionalism. Teachers want to work with teachers; and they want technicians to "fix" their hardware.

Address Instructional Support Issues

It is important to note that St. Louis teachers have asked for *instructional* technology support as well as technical technology support (as detailed above). Instructional technology support is much

¹⁹ SEIRTEC, 1999 as well as numerous other sources as detailed in this report's Bibliography

more oriented to the "why" of technology integration than the "how." While a technician might be able to fix network problems or maintain a piece of hardware (e.g., changing ink cartridges in a printer), an instructional technology support person would help teachers actually use technology in the classroom environment. The Instructional Technology Specialist - as these individuals are commonly known in many school district - should have expertise in teaching, as well as professional development and technical skills.

At present, the district has one consultant instructional support specialist. This should be expanded so that there is one specialist per level (Carrie Knause and Nikkari could potentially share a position).

We want to emphasize that the Instructional Technology Specialists should be tasked exclusively to work with *teachers*. While they may often co-teach classes with regular classroom teachers, it is important that these specialists not be hired as "computer teachers" who are tied to labs and expected to shoulder the bulk of instructional responsibilities that relate to students using technology. We understand that this is a difficult distinction for many districts to make since the ideal Instructional Technology Specialist will be a certified, former, classroom teacher. For budgetary reasons it's all too tempting to make the Specialist assume classroom teaching responsibilities. Nevertheless, where districts have realized the greatest success in their technology integration efforts, we invariably find a certified Technology Specialist working on a building-by-building basis with classroom teachers.

The “Value” of Instructional Technology

Linking Technology Evaluation with Traditional Measures of Improvement

When considering the indicators, rubrics, and findings developed for St. Louis's educational technology evaluation, it is reasonable to ask if there isn't another "bottom line;" that is, what is the connection -- if any -- between student and teacher technology use and traditional student assessments such as standardized test scores. Given the amount of attention provided to these traditional assessments, it is certainly expected that one should attempt to tie all important educational initiatives, such as technology, to performance gains or losses on these scores.

We believe that there *is* a link between technology and student performance as measured by traditional assessments; but this link is not direct. In other words, technology alone is not responsible for increases in student achievement. Rather, the integration of technology is one of a number of changes and improvements made to the teaching and learning environment. When these changes are made *systemically*, then student performance does indeed increase.

Perhaps the strongest point we make in our full evaluation report is that technology *alone* has little positive impact on student achievement or teacher behavior. In fact, we find that as a whole, St. Louis schools are reasonably rich in technology tools and devices. Teachers for the most part are actively using this technology as a personal productivity tool. But, what we find is that the simple existence of the devices and the fact that teachers know how to use word processors and email does not insure that technology will be used in ways that impact student achievement.

Educational research is absolute in its findings that student achievement increases when learning activities are engaging and student-centered²⁰. Learning needs to be standards based, relevant, attuned to the individual student's style of learning, and holistic -- that is, tied to a student's prior knowledge, experience, and interests. Another way of saying all of this is to shorthand these descriptions and state that high performing student learning is engaged and constructivist in nature and guided by strong and meaningful curriculum frameworks. Students who are able to work in environments which encourage this type of learning *will* achieve their maximum potential. While existing standardized tests do at best only an adequate job of truly measuring student achievement and knowledge, students who are the products of supportive learning environments and reformed teaching practices will generally score higher than students who are not.

When one examines the various indicators developed by the St. Louis Technology Evaluation Committee, one can see that how the indicators have been written to "reward" those uses of technology which are products of and supports to high performance learning environments. In the report, we go into great detail about how the upper level indicators ask us to find examples of student-centered, constructivist, learning. This is no coincidence. The committee's work and the indicators they developed were informed by a knowledge of what the research says about technology and learning. High performing schools use technology in ways that score high on the committee's indicators. What the evaluation shows is that the district could do better in terms of

²⁰ See many of the references in the report's bibliography, particularly those relating to Constructivism and student learning.

how technology is being used to support student achievement. In other words, if we had been able to score the district higher on our technology rubrics, we would certainly find that the district as a whole would have higher standardized test scores. This is what we mean when we say that technology could do better, and teachers can do better.

It all comes back to the same basic point, and that is technology is only useful -- and in this case, we can say, "impactful" -- tool when used in the hands of a skilled teacher. The issue is pedagogy, not computer skills. Subsequently, schools where teachers are employing reformed instructional practices, where administrators support and expect such practices, where students are actively and excitedly involved in the process of learning -- these schools will be "high performing schools" *and* these schools will show high levels of performance using virtually any type of assessment (traditional standardized test, portfolios of authentic student work, etc.) applied.

So, do schools that use technology "do better"? Yes. Although it is quite clear in the research that this is only when the technology is used within the context of a whole range of reformed instructional practices. Technology *alone* does little or nothing to improve student performance.

Control Group Research

Districts often ask how technology's impact can be evaluated in the absence of control group research. In other words, is it not necessary to have a control group of students or teachers -- where no technology is used -- in order to compare this control group's performance is compared with that of the "technology infused" students/teachers? Our answer to this question is "no" for several reasons.

First, "improved performance" and "impact" are relative to each individual school, district, and student. What counts as improved for one group of students might not be so for another group in a different school, class, or district. This means that it is conceptually impossible to find true control groups. Learning is not equivalent to, say, disease. Unlike a physical disease where a treatment might be studied with control groups -- one group is "cured" and another is not -- education and learning are not absolutes (i.e., "learned" and "didn't learn" are highly subjective states). Additionally, learning is the result of the confluence of a large number of interventions. There is not just "one thing" that happens to a student to "make" him/her learn. The number of interventions and the relationship between them makes controlling for the impact of any particular intervention virtually impossible. In short, truly controlled research is not possible within educational research. This stands as true when trying to measure any educational intervention.

Even if controlled research were possible in a given district or school, such research would be politically impossible in most settings. How many parents would allow their children to be placed in classrooms made completely devoid of technology for research purposes; particularly when other children (in the same school, and same grade) were working in very differently structured/infused classrooms? How many teachers (or teacher unions) would submit to such working conditions for the purposes of research? While one might think to use classes in other schools or districts for the control, the discussion in the previous paragraph highlights the fallibility of this approach. No, the control group needs to be in the same school and grade, and this is simply un-salable in most districts.

Does this then mean that technology needs to be implemented totally “on faith?” Absolutely not. As we have argued repeatedly in this report, technology should only be integrated as part of a broad strategy for rethinking and reforming curriculum, instruction, and assessment. When a district takes this approach, the specific value of individual interventions (e.g., technology) fade in comparison to the overall improved outcomes.

In truth (as discussed above), teachers find it very difficult to implement reforms such as constructivist approaches, reduced class size, individualized instruction, and authentic student assessments without the application of technology. Therefore, the value of technology is found in its ability to support these reforms, and it is thus more appropriate to assess the *reform* and not the various tools that support the reform. We believe that this is what St. Louis has done in its technology evaluation rubrics with their emphasis on evaluating technology’s use within a range of reformed teaching and learning practices (versus evaluation of the tools themselves).

Is It Worth It?

Most districts ultimately ask if it makes financial sense to invest funds in technology versus other tools that support reform. This is often the *first* question that Superintendents, Boards, and many community members ask when considering technology impact and evaluation. We have several answers to this question, which we can also highlight using observations from our St. Louis evaluation.

First, recall that it is our position that technology is not properly conceptualized or used when it is considered a “reform” in and of itself. When a district invests heavily in technology infrastructure (hardware, software, networks) and perhaps in training that only covers the mechanical (how-to) operation of the technology we believe that the district must have a flawed (yet very common) understanding of technology. If the technology is just positioned as a “thing” put in front of teachers, then it is indeed being treated as a stand-alone “reform.” *In cases such as this*, we believe that technology has little value. The financial resources spent on technology would often be better spent elsewhere.²¹

We find that while technology is often brought into a district in the above-described, isolated, manner, teachers usually begin to demand more direction (often vocalized as “more support”) and more help in utilizing these tools to truly help students. This is indeed what is happening in St. Louis. We repeatedly heard teachers say that they didn’t need more “stuff” but rather that they needed more training and direction as to how to use the stuff they had.²²

What St. Louis teachers want – and what we believe that teachers everywhere want – is support in using technology tools as tools for learning. While the teachers may not be entirely sure even what that means, this is the general direction in which they would like to move. Until that training occurs, technology will continue to be “one more thing” for the teacher to deal with. With the

²¹ We should note though that in districts where this sort of flawed technology use is common, there is usually little understanding of how else to spend the money that is currently being spent on technology. In other words, in these sorts of districts, technology isn’t the only “bad decision” in evidence.

²² It is important to note that they do have issues relating to making sure that the existing technology is well-supported and properly configured for their use.

proper training and guidance teachers will be among the first to see how these tools can be used to support the reformed environments that most teachers desire.

What this also means is that there are “right ways” and “wrong ways” to spend technology money. The wrong way is to buy infrastructure and then not provide the technical and instructional support necessary for teachers to utilize the investment. If that is the case, then there is no wisdom in continuing to put resources into purchasing more technology. On the other hand, when a district is flexible about how it allocates its technology money – sending more money to professional development, support, and/or maintenance when appropriate – then the overall value of its technology investment increases. This is the “right way” to spend technology money.

So once again, the value of a district’s technology investment is not a black and white issue. The value is relative to *how* the money is invested; and districts need to keep spending in order to maximize the value of the existing investment. Further, technology’s value is also relative to how a district manages the big picture of educational reform. It would be difficult to manage most reforms without utilizing technology tools, and outside of the context of reform there is little value (financial or otherwise) to technology.

St. Louis Public Schools has demonstrated that at some level it understands the intricacy of this argument. The evaluation questions and related indicator rubrics produced for this “technology” evaluation are in fact investigating the utilization of technology within common reform initiatives that are relevant for students across the nation. The ongoing challenge for St. Louis will be to maintain this level of scrutiny over technology and its overall reform efforts in the face of continually tight resources and the natural desire to expect direct results from each component of a very complex system. Nevertheless, we believe that the district is approaching this situation from an informed perspective, and for this the district must be applauded.

Next Steps -- Recommendations for Further Research

In the coming school years, the District should reapply the assessments detailed in this report. This means gathering data, considering the data vis-à-vis the performance rubrics, and reviewing and making recommendations for change to the District's technology support/implementation program. There are also several modifications, or areas for further research, that the District could make to its annual assessment process. These are:

- Increased focus on *administrator* data to determine the vision and capacity for district and building administrators to be instructional technology leaders
- More detailed data on *teacher* attitudes and opinions regarding teacher and student technology competencies
- Mapping of District Strategic Technology Plan goals to evaluation questions and recommendations

Finally, it is very important that the District maintain the capacity of the Evaluation Committee -- either as a distinct committee or perhaps folded into the District Technology Committee -- to monitor the overall impact of technology on St. Louis's teachers and students. Important within this monitoring function is the maintenance of the "historical memory" of recommendations made (e.g., those in this report) and how or if they were implemented. In other words, someone or some group needs to remember the recommendations and hold the District accountable for their implementation.

Evaluation Committee Members

Administration

Bob Lange.....Superintendent
Kristi Hasler.....Carrie Knause Principal
Bill Mayes.....Board of Education President

Board of Education

Annette Elder.....Board of Education Trustee

High School

Chris McJilton.....Business Applications Technology teacher
Steve Kelly.....Chemistry, Physics

TSN

Tracy Seeley.....Media Specialist
Mike Simon.....Special Education

Nikkari

Rene Fabiano.....Fourth Grade

Carrie Knause

Sherri Koch.....First Grade

Technology

Steve Cameron-Director of Technology
Mike McCloskey- K & M Educational Technology Consultant

Rubrics

Student Impact Rubric

Evaluation Question

Do St. Louis Public School students effectively use instructional technology to enhance their learning and support proficiency in the state standards and benchmarks?

Basic Indicator

Technology in St. Louis Public Schools is thoroughly integrated across the entire learning process – including the assessment of student work and progress. Instructional technology is used to support collaborative, project-based learning that models the skills and practices required in the real world.

Through the thoughtful integration of technology, students are actively involved in their learning. They are using technology to find, discover, analyze, and present information within a range of curriculum activities directly aligned with core curriculum standards and benchmarks.

Level 4

Students across the district are visibly involved in their own learning using technology. Students work in teams and collaborate around a variety of learning activities which integrate technology tools. Technology infused activities are well-connected to the core curriculum and have clearly-defined learning objectives. Learning activities are based in real-world tasks and situations which engage students' interest and imagination.

Consistently, across all grades and subjects, the teacher is seen a guide to this work rather than the central fixture. Teachers effectively model the use of technology as a tool for learning and presentation.

Teachers consistently assess student technology use as an integral part of learning activities. Technology is also used as a vehicle for student assessment. Students create rich portfolios of work from across a variety of curriculum areas that indicate who they are, what they are, and what they're all about. Teachers, parents, and administrators have access to these materials for the purpose of assessing student performance.

Level 4 Evidence

- Teachers' plans clearly identify technology-supported activities which are linked to core curriculum learning
- Groups of students collaborate on the development of technology-supported work product (e.g., presentations, publications, online materials)
- Students are teaching other students.
- Students conduct independent research using a variety of online resources such as the WWW.
- Teachers use technology tools and resources to establish and frame topics for student work
- All teachers have established clear expectations, along with rubrics for assessment, for student technology work
- Students create electronic portfolios of their work and these portfolios travel with students throughout their career in the district

Level 3

It is common to find that technology is viewed as an extension to traditional learning activities. Across the district, there are limited instances of students who are integrally using technology in student centered, collaborative, and authentic tasks (i.e., performing at “Level 4” in this rubric). These examples are isolated to a minority of classrooms in each building.

Many teachers, particularly in elementary and middle grades, are creating student-centered learning environments. There is evidence that technology is playing a role in the structure of these classrooms and is commonly used by students as a tool for learning. Technology use is often tied to core curriculum objectives.

Most teachers have established guidelines and assessments for student technology use. Some students are creating electronic portfolios of their work, but these portfolios are not used systemically throughout a student’s experience in the district.

Level 3 Evidence

- Many teachers are asking how technology can improve current practice
- Some classrooms, in each building, demonstrate the student-centered, collaborative, real-world learning that is characteristic of “Level 4” performance
- Teachers can clearly articulate the connection between technology-supported activities and core curriculum, but actual evidence of this connection is not prevalent across the district.
- Most teachers have explicit expectations – e.g., rubrics – for assessment of student technology work
- Few teachers have identified ways that technology can make things possible that would not be possible otherwise.
- Students report using technology in classrooms, computer labs, library, and elsewhere around the school building

Level 2

Students across the district use technology tools as a way of producing final work products. It only replicates what students would do traditionally without the availability of technology tools or resources. Students seldom use technology as a tool for collaboration. Technology use is often seen as an “add on” to traditional learning activities.

Technology use is almost always assigned by teachers. Students seldom make personal choices to use technology within their learning activities. Technology use is often perceived of as an end in itself and not tied to real-world problems or situations. While students are “motivated” to use technology, it does not appear that there is any connection between this motivation and curriculum-based learning.

Some classrooms are organized in a student-centered manner, although these tend to be found in isolated pockets and grade levels. Most teachers still teach in teacher-focused classrooms.

Level 2 Evidence

- Teachers see the WWW as a tool for research, but are not critical of any of the information found
- Teachers assign the use of technology but have little involvement in shaping or assessing student technology use
- A few – but not most – teachers have explicit expectations for student technology use (e.g. rubrics).
- There is use – across grade levels – of word processors to “type final papers”; but there is little evidence of students using technology as an integral part of the writing process.
- Most classrooms appear organized for teacher-centered instruction (e.g., desks in lines facing the front, no learning/activity centers, computer is behind the teacher’s desk, etc.)
- Few examples of technology-produced student work are displayed in classrooms
- Most student uses of technology occur within the school’s computer lab

Level 1

Most classrooms are traditionally organized with teachers as dispensers of knowledge. Technology, when used, is usually an activity which stands apart from the mainstream of curriculum learning. Technology use is often perceived of as a “reward” or “free time” for students. Teachers turn over facilitation of their classes – when they are “using technology” – to the media specialist.

Students’ use of technology is not part of most teachers’ planned activities.

Students do not have clearly defined goals and objectives in their use of technology. Technology plays no systemic role in the assessment of student work.

Level 1 Evidence

- Un-directed use of WWW resources. Students spend the bulk of their time online searching for and viewing personal information
- No evidence of electronic portfolios. Most student work, even if produced electronically, is reduced to hardcopy.
- Virtually all student technology use occurs strictly within the school computer lab
- Teachers “abandon” their classes when in the school computer lab.
- Teachers seldom identify technology-based activities in their daily/weekly plans
- Teachers do not have explicit expectations – e.g., rubrics – for assessment of student technology work

Teacher Use Rubric

Evaluation Question

Does StLPS provide adequate support and appropriate professional development resources for its **teachers** to effectively use technology to positively impact student achievement aligned with district goals and expectations?

Basic Indicator

Through technology professional development, teachers have developed a clear connection between their technology skills and how these skills can be integrated into the classroom environment for improved student achievement. Teachers use technology to facilitate instruction that addresses the needs of all learners and diverse learning styles.

Teachers use technology tools and resources to make more efficient and focused use of their time.

Technology professional development in St. Louis Public Schools is readily available and accessible to teachers at all levels of technology use and proficiency. Technology professional development is purposeful and tied to district expectations for teacher development. Teacher technology skills are developed within the context of instructional needs, strategies, and teacher productivity.

Teachers understand their role in sharing the skills they develop in their technology professional development

<p>Level 4</p>	<p>Teachers at all grade levels and in all subjects clearly understand how technology can be integrated within their classroom environment for improved student achievement. In particular, teachers demonstrate that they know how to use technology to maximize learning for all of their students.</p> <p>Across the district, teachers are using technology in ways that create make efficient use of their time and have the overall impact of creating more time for teaching. Teachers have reached a comfort with their use of technology so that it creates efficiencies rather than increased demands on their time.</p> <p>The district has adopted and implemented a clear set of teacher standards and expectations for teacher technology skills. All teachers are aware of these expectations. Professional development is clearly aligned to the expectations and focuses on the achievement of skills articulated in the expectations.</p> <p>Technology professional development is intensive and pervasive. The district has defined a process for ongoing sharing of technology skills and ideas. Teachers clearly understand and implement their part in this process. Collaborative efforts are happening quite frequently across the curriculum. Teachers adopt a planful approach to professional development and make connections between their training and how it might impact student achievement.</p>
	<p><i>Level 4 Evidence</i></p> <ul style="list-style-type: none"> • Across the district, there are understood and communicated district expectations for teacher technology proficiency • Technology professional development focuses on the curricular and professional applications of technology. • Teachers routinely use technology to share information with students and parents (e.g., email, ThinkWave, teacher websites, etc.) • Nearly all (over 95%) district teachers have obtained “Advanced” or “Expert” proficiency using the HPRTEC Technology Skills Profiler tool. • There is demonstrated growth in teachers’ understanding of the role that technology plays in curriculum as measured by the district’s technology curriculum skills assessment • Teachers across the district report that they are highly satisfied with the technology professional development facilitated by the district • Teachers share technology skills, ideas, and collaborate across curriculum areas. • Teachers are very pleased with the quality and quantity of technology support within their buildings and across the district

<p>Level 3</p>	<p>Virtually all teachers have minimum technology skills related to basic computer applications. Many teachers have developed proficiency in higher-level applications (e.g., PowerPoint, search engines, more complex features of their word processors and email package).</p> <p>The district has created and adopted a set of teacher standards and expectations which map technology skills to professional productivity and curriculum-based learning activities. Most teachers are aware of these expectations and are planning their technology professional development activities to develop the required skills. These teachers include in their plan a way of disseminating their learning to fellow teachers.</p>
	<p><i>Level 3 Evidence</i></p> <ul style="list-style-type: none"> • The district has developed and communicated expectations for teacher technology proficiency, but there is evidence that these expectations are not universally understood and applied • Most technology professional development relates to the curricular and professional applications of technology, but there are still some “how to” workshops for which there is no clear teaching and learning goal • Many teachers use technology to share information with students and parents • Most (more than 50%) teachers have obtained “Advanced” or “Expert” proficiency using the HPRTEC Technology Skills Profiler tool • In each building, there is evidence that some teachers are sharing their technology skills with peers. • Most teachers are satisfied with the technology professional development facilitated by the district • Most teachers are aware of the procedures in their building and district for technology support and report a high level of satisfaction with this support

Level 2	<p>Most teachers have minimum technology skills related to basic computer applications (e.g., email, word processor, WWW).</p> <p>The district is in the process of creating and adopting a set of teacher standards and expectations which map technology skills to professional productivity and curriculum-based learning activities.</p> <p>The district has developed a process for the sharing of technology skills arising from technology professional development, but teachers are not actively participating in this process.</p>
	<p><i>Level 2 Evidence</i></p> <ul style="list-style-type: none"> • The district has started to develop expectations for teacher technology proficiency, but for the most part teachers are now aware of these expectations • Most technology professional development is skills-based, “how to”, workshops with little explicit connection to how teachers will use these skills in specific grade and subject area curricula. • A few teachers use technology to share information with students and parents, but this is by no means a routine occurrence • Fewer than 50% of teachers have obtained “Advanced” or “Expert” proficiency using the HPRTEC Technology Skills Profiler tool • Teachers are generally aware of the district’s technology professional development, but few have any opinion on the quality or quantity of this training • Teachers are aware of the procedures (in their building and in the district) for technology support, but do not often exercise these options.

Level 1	<p>Most (but not all) teachers are developing minimum technology skills but these skills have not been applied to professional productivity or curriculum-based learning activities.</p> <p>There are no officially documented standards and expectations for teacher use of technology, although there is the clear <i>intention</i> that such expectations be developed.</p> <p>Most teachers feel that technology learning is an unwelcome burden on their time. There is no clear process for on-going professional development or sharing of learnings gained from various professional development experiences. Those skills that are developed lie only with those trained and are not disseminated.</p> <p>Teachers exercise little judgement as to the professional development they take.</p>
	<p><i>Level 1 Evidence</i></p> <ol style="list-style-type: none"> 1. District expectations for teacher technology proficiency are not documented, communicated, or understood 2. A majority of teachers report that they “do not have the time” to use technology within their practice 3. Teachers are often not aware of the technology professional development options available in their schools and in the district 4. There is little to no evidence that teachers use technology to communicate with students or parents 5. Few (less than 10%) teachers have obtained “Advanced” or “Expert” proficiency using the HPRTEC Technology Skills Profiler tool 6. Teachers are generally unclear as to who to turn to in their building for integration assistance with technology

Focus Group Data Summary

Teacher Focus Group Questions

Student Access and Use Questions

1. Describe how your students typically use lab or classroom computers (specify lab or classroom).
2. Please describe the *most common* use of technology by your students.
3. Do you prefer that your students use more skill-oriented (i.e. Math Blaster, Reader Rabbit) or open-ended (i.e. Time Liner, WebQuests) software... and why?
4. In what ways do you see technology in your school being used to support differentiated instruction and/or to individualize learning?
5. If your students use the WWW, could you briefly describe *how* they use this resource.

(We're looking to see whether the teachers have an understanding of "research" or are they basically just allowing students to do open-ended web searching with little in terms of defined expectations as to what the end result will be)

6. We're interested in your impressions of how information technology has impacted your students' learning. Overall, how have students been impacted by the use of technology in your school?

more motivated?
more engaged?
better cooperative learners?
more effective "reward" for completing work?
more distracted?

7. In general, who suggests the use of technology in a particular learning activity? You, or your students? Please provide some examples.

(prompt for "I give the assignment to use tech" or..."They come up with these ideas mostly on their own and I just support" or... something else in between. The point is to determine teacher role in student tech use AND to get a handle on whether or not a "computer teacher" has a role, an if so, what.)

8. **What changes could be made to technology in your school, which would allow *your students* to benefit more from technology?**

Hardware
Software
Support
Policies
other...

Teacher Fluency Questions

9. **Please describe how you *most frequently* make use of school computers. We don't want to know all of what you do...just what you most often do.**
10. **What is the most interesting or intriguing use of technology in education that you have ever heard about? It doesn't matter to us whether you can actually **DO** this yet...we just want to know what you find interesting.**
11. **In what ways, if any, has use of technology improved your teaching**

(probe for not just mechanically, but in what ways have they seen improvements in practice)
12. **Can you think of – and if so, please describe – ways that technology has enabled you as a teacher to do things that you could not have done otherwise without technology?**

Policy and Professional Development Questions

13. **What expectations does the district have in terms of teacher use of technology? How are these communicated?**

(probe for expectations that relate to both teacher productivity and curriculum integration)
14. **Do you believe that the district has offered sufficient professional development to assist you in meeting these expectations (*or if no expectations exist, then just comment on technology professional development*)?**

(Probe for them to talk about the kinds and types of tech PD offered)
15. **Please describe for us the type of technology support you receive from your school or the district. Is this adequate? Why or why not?**
16. **What barriers have you encountered in trying to use technology with your students in your school?**

insufficient support
too little time to learn
inadequate professional development
periods too short
finding software
Other _____

17. Is there anything else you would like to share with us?

THANK YOU FOR YOUR TIME AND EFFORT!

Elementary Teacher Focus Group Summary

The elementary focus group consisted of 7 teachers from Eugene Nikkari Elementary School, and Carrie Knause Elementary School. There was a representative sample of teachers from the second through fourth grades, as well as K-5 Special Education teachers.

The following report organizes and summarizes participant responses by question category. A full list of all questions will be found in Appendix of the final year one evaluation report.

Student Access and Use

At the elementary level, teachers reported that students primarily use classroom computers for skill reinforcement programs, word processing, Internet research (sometimes partnering with another student), free time fun and CD ROM encyclopedia research. While that is the case in many classrooms, there is evidence that in a few classrooms, as one teacher stated, the computer is "off limits to students." It was noted that some teachers themselves are not comfortable with the available computer technology and thus their students do not use it either

The most often stated barriers to the use of the computer are lack of time, knowledge and comfort with the tool. "Lack of availability" was cited as the reason that teachers are rarely able ("once or twice a year") to use the few available scan converters to hook the computer to the TV.

The computer lab is primarily used for scheduled computer classes. During computer class, students use the *Wasatch program*, math drills, word-processing, *Accelerated Reader* or the Internet. Others use *Grolier's* encyclopedia or keyboarding software. The most common uses of technology by students at the schools are word processing and skill reinforcement. Focus group respondents noted that the computer lab is "only sometimes" used to relate to what is being taught in class.

About a third of the teachers in the focus group prefer that their students use more skill-oriented software, because its use is easier to manage. Other reasons given for this preference were that students can work at their own individual levels, skills are documented, they respond well to repetition, and it allows the group to move along without having to wait for the student who needs extra assistance.

Other focus group teachers stated that they prefer open-ended software because the possibilities for projects are greater. Some stated that the software students use at home is more skill-oriented, and they prefer them to learn additional computer skills at school. The remaining group thought exposure to both types of software was a better balance of computer usage.

Teachers see technology in their schools being used to support differentiated instruction and/or individualized learning in a number of ways. First, technology tends to keep students on task. If they move around it is more of what one teacher referred to as a "focused wobble." Second, the computer supports various learning styles because it is tactile, visual and auditory. Third, adapting general education tasks to computer use can help students feel less threatened. An example of this would be typing a story in word processing. Having the computer edit the writing in lieu of a

peer, may be more comfortable for some students. Fourth, slower students can go back over their work while faster students can move on to another activity, freeing up wait time. It allows students to work at their own pace and level.

Teachers reported that if their students use the World Wide Web at all, it was most often used for research on topics being covered in class or to support projects currently assigned.

Teachers reported that technology has impacted their students' learning in various ways. In particular, students seem more excited about information being studied and willing to dig deeper using the computer as a research tool. It is an extra avenue of learning and offers something a little different. Teachers state that students are more motivated, engaged, and proud of the end results when they are computer generated. Skill reinforcement programs may be viewed by some students as a reward. Another impact includes the availability of new and up-to-date exciting Internet information. Lastly, almost all students find success with computers where they may not feel that way about other classroom topics.

Teachers reported that student technology use is almost always ("95% of the time") teacher-directed. A few teachers noted that some students get ideas (for the use of technology) from their parents and subsequently they will bring in technology-created work which they have done at home.

Teacher Fluency

Elementary teachers reported that they most frequently use school computers for a wide variety of activities. Internet research, word processing, writing reports, e-mail, record keeping and CD ROM management were all mentioned.

When asked what is the most interesting or intriguing use of technology in education that they have heard about (and may or may not have used) many responses were given. Multimedia presentations by software like *PowerPoint* or *Hyperstudio* were mentioned. Some wanted to know how to download and use pictures from the Internet. Others referred to seeing examples of students publishing and printing their own books and Ebooks. Teachers were fascinated by the ability of educators to make their own homework packets and templates for flashcards. Also mentioned were online quests (in particular the *Maya Quest*).

It is felt that technology has improved the teaching of the elementary teachers in many ways. First, the teachers state that they feel more informed because of the Internet. Information is readily available and it makes them more motivated to do research. The Internet also has numerous lesson plans available, giving them the ability to be more creative. The computers make the classroom more fun and teachers report that they get excited about the information they can easily access and this enthusiasm rubs off on their students. If they create worksheets and reports for students, technology makes the papers look more engaging. Email makes it easier to communicate with parents. Some mentioned that the ability to bring the world to their students makes them feel like more effective teaching professionals.

When asked if they could think of ways that technology has enabled them to do things that they could not have done otherwise they again mentioned the vast amount of possibilities the Internet brings them is significant. For example, students can look at museums around the world and

information is retrieved quickly. Many professional links are available to them for connecting with other teaching professionals. Allowing students to correspond with other students via e-mail is significant for collaborative projects. The ability to digitize pictures and see them instantly on the computer is an improvement from having to have film processed.

Policy and Professional Development

Expectations of the District and How They Are Communicated

Elementary teachers were asked what expectations the district has in terms of teacher use of technology. Some responded that they felt the district couldn't understand why teachers were not readily using all the resources and didn't understand the lack of support and time involved. They have heard that the district spent "\$5,555 per teacher, [the taxpayers] want to know if they are getting their bang for the buck."

Teachers feel there is no leadership or focus for the district's technology. One teacher said, "A curriculum was created two years ago and we haven't seen it since." Another teacher stated, "I don't have a clue what their expectations are and it hasn't been directly communicated to me." Another comment was, "We don't understand how to use the classroom computers [in the curriculum], so how can our students understand". They also expressed concern that a computer professional with no teaching background is giving them ideas that aren't feasible in the classroom.

Professional Development

Teachers feel that professional development, when offered, is untimely (toward the beginning of the school year) and takes too much time away from the classroom, undermining their ability to manage the class. (This was a specific reference to the I3 training that occurred for an entire week during September) Also they mentioned that workshop-based learning of programs and hardware that really isn't readily available in the classroom .is not helpful.

Challenges

When asked to describe the type and adequacy of support received from the school or district, elementary teachers were quite clear in that they felt it was inadequate and haphazard and not geared towards their needs. Their particular needs relate to the use of the computers to enhance their curriculum and they felt the support personnel could not understand this. One teacher said, "I need someone to talk to me, not at me."

Barriers encountered in trying to use the technology with their students included lack of functioning equipment, a questionable process of obtaining software, and insufficient support.

Changes Suggested by Elementary Teachers

Elementary teachers made a number of suggestions for changes that would allow *their students* to benefit more from technology.

Technical reliability of hardware and the network is a major concern. One teacher said, "With unreliable technology I tend to give up and feel it is not worth the time and effort." Teachers noted that the lab does not always "function correctly" and this led the focus group participants to suggest that each school should have its own technology staff person for hardware and software support. Sometimes, the lab only has ten computers that are able to get on the Internet and the connection is very slow.

The ipacs do not have 3.5-inch disk drives and some were upset that students would no longer be able to carry work back and forth from home on a disk.

Focus group respondents also noted that a curriculum-aware instructional support person who specializes in technology integration should be readily available to mentor teachers, working alongside with them in the lab or classroom. It was also felt that time for professional workshops and to collaborate with other teachers would be helpful. Participants stated that a policy for the district that holds students more accountable for the use of technology would help them prioritize technology pedagogy. They also felt that access to digital cameras, scanners, and scan converters readily available would benefit students greatly.

The teachers in our elementary focus group stated that a process in the district for the purpose of purchasing software is important. One teacher mentioned, "Kindergarten teachers have been trying for two years to get a site license." Several teachers in conversation mentioned that over the past year they have requested software purchases and still (even after several months) have not heard what happened to the requests.

Finally, the focus group participants stated that in their opinion, students need more computer lab time and a qualified computer teacher who could determine a curriculum for each grade level. The fourth grade could benefit from software that is appropriate to their skills. **It was also felt that it would be very helpful to have the same software available to the classroom as in the lab.**

Middle and High School Teacher Focus Group

Our middle and high school teacher focus group consisted of seven teachers -- a 6th grade teacher, an 8th grade science teacher, a middle school computer teacher, a high school business teacher, art teacher, English teacher, and the high school librarian.

The following report organizes and summarizes participant responses by question category. A full list of all questions will be found in Appendix of the final year one evaluation report.

Student Access and Use

Teachers report that in middle and high school students will typically use the labs for word processing, Internet research, entertainment before and after school, and business (accounting) software. They may also do keyboarding, *Excel*, *PowerPoint* and use graphics in various applications. The art program at the high school uses the Internet for world museum tours. In the classroom, teachers may have one student or small groups of students do Internet research. One teacher commented that it was difficult to do anything with the classroom computer since there is only one.

The most common use in the middle school lab is the introduction to various programs and skills in word processing, *Excel*, and the Internet. High School teachers state that word-processing, Internet research graphic retrieval, and one teacher reports that *Southwestern Accounting* software is frequently used (and therefore he would like to see it installed in the lab).

Teachers were asked whether they preferred their students to use more skill-oriented or open-ended software. The high school business accounting program uses a skill-oriented accounting package. Some teachers stated that they choose the open-ended software for its versatility and complexity. In Art, the program uses both kinds. Some teachers report that they only have access to basic tools (e.g., Office) and do not have access to any curriculum-focused software. To support differentiated instruction or individualize learning, teachers report seeing limited evidence of technology being used. Students across the board are being exposed to technology, but they are limited to the programs currently on the systems. One teacher mentioned that, if the opportunity is presented, technology use for some could be student directed, as it gives them more choices on ways to approach a task. One teacher said, "It (technology) opens different paths to learning".

Students in the middle school and high school, when using the World Wide Web, research history, or other subjects. *Ask Jeeves* is used at times for searches. If a question comes up in class, the computer may be used to help answer it.

Impact

Teachers were questioned about their impressions of how information technology has impacted their students' learning. Answers included the benefit of how easy information retrieval has become and that this makes research more motivating and enjoyable. The final product of using a computer and the various peripherals is "more fancy" thus instilling pride in the author. Teachers witness more cooperation and a trip to the computer lab is almost always met with student enthusiasm. Since the use of computers can sometimes lead to frustration, one teacher felt it necessary to mention that the impact may not be all positive.

In these higher grades, it is said that teachers and students will suggest the use of technology for certain tasks more often than in the elementary. Students in the high school will sometimes suggest typing a rough draft of a report on the computer, rather than writing it out.

Desired Changes

"Technical support is lacking" was the consensus of this focus group. Several group members report that as a matter of district policy they cannot contact the technician directly with their technical questions. A greater involvement in the process of purchasing hardware and software is needed. The ipacs do not have 3.5-inch disk drives and some were upset that students would no longer be able to carry work back and forth from home on a disk.

One teacher said, "The computer committee and computer heads need to communicate better. The technology plan does not even mention the committee." Teachers complain that they have asked for specific software in the past and never get it or that it does arrive but is not installed for a year and a half. They all agree that the maintenance required for the systems is too much for one person. Teachers suggest that the district employ an additional technician as well as a technology staff developer.

Teacher Fluency

Teachers most frequently use the school computers for *ThinkWave*, e-mail, word-processing and Internet research. The most interesting or intriguing uses of technology in education that they have heard about but not necessarily used include distance learning, publishing student work online, collaborative work, *SmartBoard* and the ability to have students' work reviewed by others able to view it on the Internet.

The focus group reported that technology has improved their teaching. First, it brings in the global world, making things more realistic. This translates into a more exciting learning environment both for the student and the teacher. They report that using technology helps students value their work more highly. Editing is easier because material can be added, deleted, or modified more easily.

Ways that technology has enabled them to do things that they could not have done otherwise include showing student progress through *ThinkWave*, and doing quick researches on the Internet. Tasks seem to be done more efficiently and the results are of better quality.

Policy and Professional Development

The focus group was asked what expectations does the district have in terms of their use of technology and how are these communicated. One comment was, "Be a whiz and do it, use the technology that has been given." Another was that there needs to be a "maximum amount of technology use, go with the flow, get on the bandwagon." Some of the group mentioned that it was unclear to them what the district wanted in terms of technology use. It is, as one teacher said, "supposed to enhance the curriculum", but how, they are not sure. They were encouraged to use the *ThinkWave* program, although not all of them do.

Professional Development

The teachers would like to get training that enables them to better understand technology as an integration component into the classroom not as something additional. The opportunity to attend more conferences that are geared toward this topic would be extremely helpful.

Challenges

The group consensus is that the technology support is "not adequate" and it revolves around the wrong type of support. The teachers believe the help that is truly needed is "curriculum integration support". The group reports that the hiring of the part-time person has helped, but further help is needed for those who have no idea on how to start.

Barriers encountered by the group in trying to use technology with the students include insufficient support, too little time to learn, and not enough professional development in technology integration. Some expressed that development programs should be offered earlier in the day when they would "not be so fried".

Other information that this group would like mentioned is that they need more printers and getting the daily attendance coordinated with *ThinkWave* would be very helpful.

Administrator Focus Group Questions

Student Access and Use Questions

1. **Describe how students in your schools typically use lab or classroom computers (specify lab or classroom).**
2. **Please describe the *most common* use of technology by the students in your buildings.**
3. **In what ways do you see technology in your school being used to support differentiated instruction and/or to individualize learning?**
4. **We're interested in your impressions of how information technology has impacted your students' learning. Overall, how have students been impacted by the use of technology in your school?**

more motivated?

more engaged?

better cooperative learners?

more effective "reward" for completing work?

more distracted?

5. **What changes could be made to technology in your school, which would allow *your students* to benefit more from technology?**

Hardware
Software
Support
Policies
other...

Teacher Fluency Questions

6. **Please describe how you – as an administrator -- *most frequently* make use of school computers. We don't want to know all of what you do...just what you most often do.**
7. **What is the most interesting or intriguing *educational* use of technology in education that you have ever heard about? We are basically looking for information on what feel are ideal ways for teachers to use technology with students.**
8. **In what ways, if any, do you believe that technology has improved your teaching?**

(probe for not just mechanically, but in what ways have they seen improvements in practice)
9. **Can you think of – and if so, please describe – ways that technology has enabled your teachers to do things that they could not have done otherwise without technology?**

Policy and Professional Development Questions

10. **What expectations does the district have in terms of teacher use of technology? How are these communicated?**

(probe for expectations that relate to both teacher productivity and curriculum integration)
11. **Do you believe that the district has offered sufficient professional development to assist teachers in meeting these expectations (*or if no expectations exist, then just comment on technology professional development*)?**

(Probe for them to talk about the kinds and types of tech PD offered)
12. **As an administrator, what do you see as *your* role in enabling the effective use and integration of technology in teaching and learning?**
13. **In your opinion, what are the primary barriers that teachers encountered in attempting to use technology with students in your building?**

insufficient support
too little time to learn
inadequate professional development
periods too short
finding software
Other_____

14. Is there anything else you would like to share with us?

THANK YOU FOR YOUR TIME AND EFFORT!

Administrator Focus Group Summary

The administrator focus group consisted of 4 administrators. This included the Principal from Carrie Knause Elementary School, T.S. Nurnberger Middle School, and St. Louis High School. Nikkari's principal was on maternity leave and thus was not able to attend.

Student Access and Use

Administrators at the elementary level reported that students were using the computer in the classroom as a center. The teachers mainly bring students to the computer lab once a week for a thirty-minute period. During this time students are using different math and reading software, including *Accelerated Math* and *Accelerated Reading* as well as working on improving basic skills in the *Wasatch* program. At the middle school and high school level administrators reported that teachers bring students in to the computer lab mainly for researching on the Internet, word processing, creating spreadsheets, designing web pages, accessing *Career Pathways*, as well as for "enjoyment". Administrators see the most common use of technology at the high school and middle school level as word processing and research and at the elementary level the most common use is working on the reading software.

Administrators see technology being used to individualize learning in many different ways. One administrator said, "Technology allows teachers to tailor a program to where kids are academically. This allows a teacher some mobility with different student's academic placement." Another way that technology is being used to individualize learning is through the opportunities for skill reinforcement during lab or center time. Administrators see technology helping the visual learners by having the ability to project presentations such as PowerPoint on a TV or large screen. They also see the *ThinkWave* program allowing students and parents to monitor assignments on an individual basis.

Administrators in general feel that technology has had overall a positive impact on their students' learning but caution that we can't let technology allow us to forget the basics. One administrator said, "We overkill technology, it is not the Mecca of education. We spend a lot of time and money and haven't seen a significant increase in learning in specific areas."

Administrators offered some suggestions that would allow students to benefit more from technology in their schools. These suggestions included more time to access computers, more computers, more in-service training for teachers to help students, as well as having a person in each school specifically trained to run the computer labs. Another need seen by administrators was that modifications have to be made to the computer lab to make them more user friendly for teachers and students.

Teacher Fluency

Use

Administrators feel that teachers are moderately fluent in using technology for productivity. However, teachers cannot make full use of their skills without access to adequate technology. Teachers typically use word processing programs and email. Teachers for the most part are very receptive to using technology, but don't have adequate access or support. Administrators noted that they most frequently make use of technology when they are using word processing to write reports and letters.

Administrators would like to see technology better integrated into the curriculum. A few noted some interesting uses of technology that they would like to see implemented in their schools.

One of the most interesting uses of technology that an administrator heard about included schools that offer classes where technology is used for radio and television production, computer programming and other career-oriented programs. Another administrator recalled a software program that involved the reading of classic texts that engages kids in a game, described by this administrator as a form of "edutainment". Another administrator was intrigued by the different uses of digital cameras. At the elementary level one administrator liked the *Kidspiration* software because of the "ease of it". *Classroom Connect* was also mentioned. "I like the concept of it [*Classroom Connect*] but thought it was kind of difficult, not very user friendly."

Impact

Administrators see technology as improving their teachers teaching by giving them a quicker and broader access to information. Technology is enabling their teachers to explore areas of information in an instant making it a more efficient use of time. They have also seen the amount of supplementing increasing among their teachers. Technology is allowing the opportunity for more sharing among teachers including more teachers teaming up to design projects with other classes. Administrators are also seeing improved communication with parents via *ThinkWave* and e-mail. They also see technology as helping to improve inter-district communication. One administrator noted, "It enables the teachers to know what is going on in the district which inevitably helps them in the classroom." Most feel that technology has brought the district closer together.

Policy and Professional Development

Expectations

The Administrators' expectations for teachers are to get them to the "advanced level." One administrator noted, "There is a high expectation about the use of technology, we talk about technology a lot and have bought a lot of technology, but I don't know if it is as clearly articulated as it possibly could be."

An elementary administrator mentioned, "Probably the one and only expectation that we've talked about is that when they (teachers) have that 30 minute computer time the teacher is the one who is expected to teach that class. " Another expectation is that the classroom computer needs to be used. This past year there was a big emphasis to begin using *ThinkWave* throughout the district. One administrator mentioned that a couple of staff meetings were set aside to help teachers learn to use the application. The expectation was, "All [middle school and high school] teachers will be online and using *ThinkWave* by the first of the year."

Professional Development

In general, administrators do not believe that the district offers sufficient professional development to assist teachers but believe the availability for them to get help if they want it exists especially through the RSED. They noted that some professional development exists but is not convenient because it is during the school day or at night.

Administrator's Role

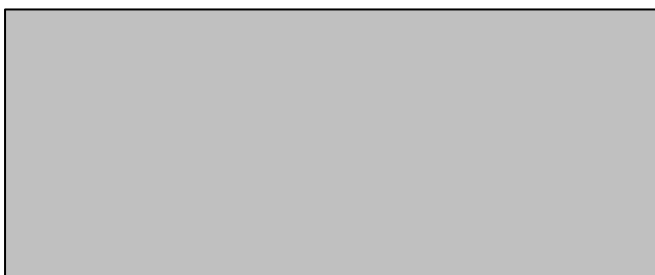
Administrators see their role in enabling the effective use and integration of technology as one of support to make sure teachers have the materials and be able to use effectively those materials. **Others see their role as a peacekeeper between their teachers and the technology staff.** They feel it is their job to get teachers to use the technology. In general, administrators feel they should know how to use technology better than the teachers in the building, but as one administrator noted, "We [administrators] don't have the time to learn all of technology."

Challenges

Administrators feel one of the primary barriers that teachers encounter in attempting to use technology include the lack of computers. Administrators would like to see more computers in every classroom as well as better access to computer labs. Additionally teachers need more technical assistance and curriculum support, including professional development.

Classroom Observation Data Summary

Observation Template



Student Uses

- _____ Students are working in teams and other collaborative groupings
- _____ Students are working on project-oriented activities
- _____ Students are teaching other students
- _____ Students are using technology tools (e.g., WWW, spreadsheets, calculators, probes, simulation programs) on an as-needed basis as tools for research, data collection, and analysis.
- _____ Students are using technology tools (e.g., word processors, presentation managers, graphics programs) to produce interim (draft or component) and final work products
- _____ Students use technology to create assessable work products (e.g., portfolio pieces)

Teacher Actions

- _____ Teacher is performing a range of guide/facilitator tasks to individual students and small groupings
- _____ Teacher uses technology in ways which model desired/intended student uses
- _____ Teacher sets clear expectations for how students are to use technology
- _____ Teacher creates assessments that account for student technology use

Physical Arrangement of the Classroom

Number of Computers: _____

Description (Networked? Processor type? Printers?):

Location(s) of Classroom Computers:

Student Desk Groupings (tables, rows, computer lab, etc.):

Evidence of Student Technology Use in the Room?

Other Technologies/Peripherals Available (video projector, TV, VCR, etc.)

Observation Findings/Data

On October 17 - 19, 2001, Sun Associates conducted classroom observations of each grade level and/or subject at Carrie Knause Elementary, Eugene Nikkari Elementary, T.S. Nurnberger Middle School and St. Louis High School. Our intention was to observe an average day at each school as well as technology resource allocation. While we visited approximately 45 classrooms (14 Elementary, 17 Middle School, and 12 High School), it still was not possible to visit every classroom or to talk with every teacher. Therefore, the following observation data is composite and is intended to present a holistic image and impression of how technology is configured and used within each school. The data is not intended to be a comprehensive inventory of all technology infrastructure and use.

Elementary

Infrastructure

Across the district, preschool through fourth grade classrooms generally have one Compaq (550Mhz, 64MB RAM, 4GB HD) ipaq computer running Legacy supported Windows 98. Each of these ipaq's has Office 2000, Netscape 4.7, an AS400 client, and ThinkWave (an assignment, grade, and attendance tracking program). The attendance function of ThinkWave is currently not synchronized (export data capabilities) with the AS400 and must be delivered on paper as well as entered in the program. While each classroom has network access, a few computers are having difficulty accessing networked resources such as printers and the World Wide Web. In addition, most classroom computers do not have individual printers, but instead share a printer in the respective school's media center. A small number of classrooms have additional computers or peripherals (printers, scanners, digital cameras, laptops) that were purchased with TTI funds or brought in by the teacher. Each classroom has a television and VCR. A few have access to a scan converter to display the computer screen contents on the television. There are currently four drops per classroom for future expansion.

Use

Classroom computer use at the elementary level varies. Elementary computers in some classrooms are used solely by the teacher, while others may be used as an activity center with age-appropriate skill-reinforcement or "free-time fun" software. In a few cases, the computer may be used for Internet or CD-ROM encyclopedia research, word-processing, or curriculum related software owned by either the district or the individual teacher. In only a few classrooms at this level did we observe students utilizing classroom technologies during our visits. The students we saw were using skill reinforcement programs. The location of the computer in the classroom varied. Most were on rolling tables in the proximity of the teacher's desk. Others were off to the side or in the rear of the classroom. In some cases the possibility of collaborative projects or research was limited because of the computer's location and objects around it.

Most computer use at the elementary level occurs in the computer labs. At Carrie Knause, the media lab has approximately twelve computers (200 MHz, 32MB RAM, 1 GB HD), which the

students use once per week in groups of two per station. The software is skill based and used to reinforce the curriculum of grades K and 1.

At Eugene Nikkari, the media center lab is used for a weekly computer class and by individual classrooms at the request of the teacher. There are twenty-seven computers (200 MHz, 32MB RAM, 1 GB HD), not all of which function properly at the time of their desired use. In the lab, students frequently run the *Wasatch* learning program, do math drills, use *Accelerated Reader* (AR), and may be involved in Internet research, word-processing, or keyboarding.

It is reported that some teachers have installed their own software (from home, single purchases, etc.). Many teachers are now aware of how to do this, and thus have not.

On the day we observed the lab, all students were working at their own computer, without having to share a station with another student. The lab has a TV and scan converter for the purpose of demonstrations.

Middle School

Infrastructure

As in the elementary schools, T.S. Nurnberger Middle School classrooms have one Compaq (550Mhz, 64MB RAM, 4GB HD) IPAQ computer running Legacy supported Windows 98. Each of these ipaq's has Office 2000, Netscape 4.7 an AS400 client and ThinkWave. Also as in the elementary schools, the attendance function of ThinkWave is currently not synchronized (export data capabilities) with the AS400 and must be delivered on paper as well as entered in the software program. Teachers mention that this results in additional time away from full attention being paid to the students.

We found that most of the Middle School classroom computers were on rolling tables. The majority are in close proximity to the teacher's desk or in an area of the classroom where collaborative projects would be limited. The remaining are placed in positions of comfortable student accessibility. All school computers are networked. There are four drops per classroom ensuring the support for additional computers (but only 1 of the four drops are functional). Teachers have used TTI funds to purchase additional peripherals and software.

Use

Classroom computers are used by teachers for word processing, Internet research, e-mail and the ThinkWave program. Students will most often use the computer for Internet research including retrieving graphics, and word processing. We did see evidence in one classroom of projects produced with technology. In another classroom students were running a skill reinforcement program. In many others the computer was powered on, but not in use by either teachers or students. While relatively few products were seen at the time of our observation, we were told that at other times of the year considerably more technology-infused student work is displayed in "some" classrooms.

All students attending the eight-week block of computer class in the computer lab, receive instruction in Office 98, keyboarding, and Internet research. The lab consists of 28 desktops (200 MHz, 32MB RAM, 1 GB HD), 1 printer, , a laptop, and a data projector. The desktops are arranged around the perimeter of the room and in a cluster in the middle. We viewed this setup as crowded and limiting the mobility of the teacher. At the time of our observation, there were no hard copies in the room of any student-produced projects or assignments.

High School

Infrastructure

At St. Louis High School, anticipating the greater computing power needed by high school students, the classroom Compaq ipac's installed have 550Mhz, 64MB RAM and 4GB hard drives. There is one in every classroom seen, including art. The majority of computers are located on or in close proximity to the teacher's desk. Only two classrooms observed had printers, although there is access to the network printers. We did not see the band/music room. Each room also had a TV and VCR, which was, in three classes, in use (VHS tapes) during our visit.

The High School has three computer labs, one for drafting, another for business, and one in the media center. The computers in these labs all match the technical capacity of the classroom computers, are networked and have at least one printer in the same room.

Use

In the business lab, there are twenty-six computers arranged around the perimeter, there were multiple classes in session. Students were witnessed working in word processing and performing Internet research. The teacher was performing a range of guiding tasks, helping each student as needed. Also in the room were a TV, VCR, video projector, adding machines, and calculators. This lab is also used to run the accounting application mentioned above.

The drafting lab had multiple classes in session also. There were sixteen networked computers and three printers. The computers were arranged on one side of the room on desks angled in the same direction. In this environment, students were working in groups on project-oriented activities. Some were witnessed assisting other students. The teacher was guiding individual students and small groupings with the tasks and giving expectations for how to use the appropriate technology.

The media center lab has twenty-five computers arranged in three long rows of eight and the being situated on the teacher's desk. The class in progress at the time of observation was using the ThinkWave program to retrieve their grades and check for completed and missing assignments. Students were seen to be helping other students, and the teacher was guiding as needed and modeling the use of the application. Students use this lab during various class times to do Internet research, word processing, spreadsheets, PowerPoint, and check assignments and grades. The lab may also be used by students outside of class, as permitted.

In the media center itself, there are additional computers (outside of those in the lab) for use by students under the direction of the media teacher. He most often helps them with efficient Internet research and applications used in projects. During our observation there was a small group of students doing word processing activities under the supervision of their teacher.

Aside from the labs we did not see any computer use by students in the individual classrooms we visited. Also, no classrooms displayed evidence of student technology output. In our discussions with High School teachers, we were told that students most frequently use the classroom computers for word processing and Internet research.

Survey Data Summary

Over the past several years, St. Louis has asked its staff to participate in several self-assessments of their skills related to technology use and integration. Staff have twice taken the HPRTEC Profiler survey (Profiler survey questions can be found in the following section of this [Appendix](#)) and for the purposes of this current evaluation project have taken a district-developed survey of teacher attitudes regarding technology integration. This survey can be viewed online at www.sun-associates.com/slps/curricsurv.html

The so-called "Curriculum Integration Self-Assessment" contained seven categories where respondents were asked to select the statement with which they most agreed. The response rate to this survey was slightly in excess of 50%.

Each of the seven questions had four possible choices. The choices for each question roughly correlated to a behaviors attributed to levels 1 (lowest) to 4 (highest) of the evaluation rubrics developed by the district evaluation committee. It should be noted that this survey was designed and planned by the district independent of the current evaluation project and this means that there is not a perfect correlation between the levels of proficiency expressed by the survey and the levels of achievement in the district's evaluation rubrics. Nevertheless, a rough correlation can be made.

The following table shows the average response for each question and interprets this response via the relevant survey statements.

Category/Question	Score	What this Score Means	Next Highest Level
Use of educational software and tools	2	I use a few computer programs as an instructional supplement	I use several programs (drill and practice, simulations, tutorials, etc.) to help all my students meet specific learning objectives.
Information literacy	2	As a part of my curriculum, I have library research projects. I am aware that there are electronic resources available to my students.	My curriculum includes student projects that require higher level thinking skills, use electronic information sources, require the use of computer productivity software, and are authentically assessed.
Use of technology for engaged learning	3	I can design activities and approaches that best fit the learning objectives and the availability of the technology available to me. I modify instructional methods to take advantage of the learning styles of individual students.	I continuously try new approaches suggested by research or observation to discover the most effective means of using technology to engage my students and meet curricular goals.

Category/Question	Score	What this Score Means	Next Highest Level
Approach to student assessment	2	I evaluate some student performances or projects using subjective criteria. I save some student work for cumulative folders and parent conferences, and print some electronically produced student work.	I use a wide range of assessments to evaluate student projects and performance assessment tools like checklists, rubrics and benchmarks which help the student assess his/her own work.
Differentiated instruction	3	With the assistance of the student, parents and appropriate specialists, I create an individualized learning plan for each of my students.	I provide individualized remediation for those students lacking the skills needed to meet my course objectives.
Using technology for professional growth	3	I use the Internet and other on-line resources to obtain research findings, teaching materials and information related to the content of my classes. I read electronic newsletters and journals to keep current on educational practices.	I organize professional growth opportunities for other teachers and feel comfortable teaching other staff members about the use of technology.
Evaluating technology's impact on student achievement	2	I gather, use and share anecdotal information and observations about student use of technology in my classroom.	I use action research and aggregated data to accurately determine whether the technology and methodology I am using has an impact on how well my students learn and on school climate.

Interpretation of Survey Data

The Curriculum Self-Assessment Survey data does essentially confirm that data gathered via observation and interview. That is, St. Louis teachers are somewhat aware of technology's potential impact on teaching and learning, but have not fully engaged with actually using technology to achieve this impact. Most telling is the response to the first question (the one pertaining to use of technology tools). Here, teachers state that they use technology as an "instructional supplement." When responding to the question about the use of technology to support engaged learning, teachers note that they use that technology "which is available." This validates our observation and interview findings where we consistently heard that teachers were not entirely satisfied with the level of technology and instructional support provided.

Profiler Survey Questions

System

1. **Start up and shut down the computer; log into a district (network) server; open and close an application/program; insert and eject removable media (floppy disk, CD-ROM).**
2. **Select and open files from a local or network drive and save them to a folder in another drive to create and maintain backups.**
3. **Cut, copy, and paste information between two open applications.**
4. **Use diagnostic and utility software (like Scandisk and Defrag) to keep your system up to speed, protect your data, and extend the life of your PC.**
5. **Access help and readme files; tutorials; and manuals to understand the features of the resources you use.**
6. **Create, copy, move, rename, print, delete, and use the Find command to locate files and/or folders on a floppy disk, hard drive or the network.**

Software

7. **Format a word processing document by changing fonts, margins, and alignment to produce professional quality work.**
8. **Set tabs and columns, spell check, and insert tables and graphics into a word processor document to increase accuracy, visualization and interpretation of subject matter.**
9. **Use spreadsheet formulas and functions to automate the manipulation and analysis of numerical information.**
10. **Create a graph from spreadsheet data to help learners analyze data and understand the power of mathematical relationships.**
11. **Produce a multimedia slide show/presentation to help students follow and conceptualize lesson objectives while showing them how to add emphasis and support to subjects being conveyed.**
12. **Record, sort, query, and print database information to teach students how to organize and manage large volumes of data.**

Internet

13. **Use Internet search engines to locate and research information relevant to personal and professional interests.**

14. Access State Curriculum Frameworks on the Internet and identify URLs (web sites) that address specific curricular content at the grade level(s) you instruct.
15. Change Internet browser (Netscape) home page; modify preferences; and add, use, and organize bookmarks.
16. Exercise proper online caution & netiquette by recognizing that executable email attachments can do your system harm (&/or render it vulnerable to hackers) and by removing extraneous information () when replying to, or forwarding, email.
17. Save a webpage graphic; reduce, enlarge, or crop it; and convert it from one file format to another before inserting it into another document.

Peripherals

18. Setup a computer, connect peripherals, and install necessary device drivers and desired software.
19. Select a different printer from the choices listed on the network and configure margins, page orientation, and specific pages or ranges to be printed.
- 20. Replace ink/toner cartridges, clear paper jams, and access printer manufacturer support pages that are posted on the Internet to guide users through routine cleaning and maintenance.**
21. Help students scan pictures and use a digital camera to preview and save material to a specific location so that it can be retrieved and used to create a persuasive research presentation.

Integration

22. Locate and evaluate learning exercises, research projects and lesson plans on the Internet that can be used to achieve curricular objectives.
23. Use computer technology resources to create an assessment rubric that aligns instructional strategies with State Standards and Benchmarks to ensure student learning.
24. Foster critical thinking skills by helping students find and evaluate resources on the Internet.
25. Develop instructional processes which maximize self-directed and collaborative student use of technology to complete presentations/projects that demonstrate appropriate outcomes.
26. Model ethical and legal use of technology by honoring intellectual property, applicable copyright laws, software licensing requirements, and our district's Acceptable Use Policy.

Interaction

27. Create an email address book, add users, and list/group them to enable distribution of a single message to multiple recipients using your To, Cc, and Bcc buttons.

28. Communicate with students, parents, and staff using email and exchange resources that enhance professional productivity and/or support instruction with colleagues.

29. Send and receive email attachments and webpage links.

30. Create and manage a classroom webpage.

Please note that the World Wide Web is volatile and constantly changing. The URLs provided in the following references were accurate as of the date of this report, but we can make no guarantees for their permanence.

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