District Technology Assessment

Fayette County Public Schools
Department of Education Technology
May, 2001

Table of Contents

Executive Summary 3
Introduction and Review of 99/00 District Technology Assessment 5
    99/00 DTA 5
    Actions Resulting from 99/00 DTA 7
Procedures 7
    Online Survey 8
    Classroom Observations 8
    Focus Groups 9
    Timeline 9
Results 10
    Online Survey 10
    Classroom Observations 13
    Focus Groups 18
Technology's Impact on Student Achievement 22
Teacher Use of Technology 26
Technology Resource Allocation 28
Conclusion and Recommendations 30
    Recommendations 31
Appendix 1. Rubrics 32
Appendix 2. Interview Questions 42
Appendix 3. Observation Forms 51
References 54

Figures and Tables

Figure 1. Overall DTA Results 3
Figure 2. 99/00 Results 5
Figure 3. Student Impact 22
Figure 4. Cardinal Valley Pilot Read 180 Results 23
Figure 5. Total District SRI Scores for Read 180 Students 23
Figure 6. Teacher Fluency 27
Figure 7. Teacher Use With Students 27
Figure 8. Teacher Productivity 28
Figure 9. Administrator Support 28
Figure 10. Infrastructure Allocation 30
Table 1. Data Collection Timetable 9
Table 2. Summary of Responses from District Technology Assessment Survey 10
Table 3. ACOT Ratings for Observed FCPS Teachers 14
Table 4. Student Centered vs. Teacher Directed Instruction 15
Table 5. Physical Arrangement of Observed Classrooms 16
Table 6. PET Project Participation 25
Table 7. TRTs in Schools 26
Table 8. School-Wide Instructional Technology PD 26

Executive Summary

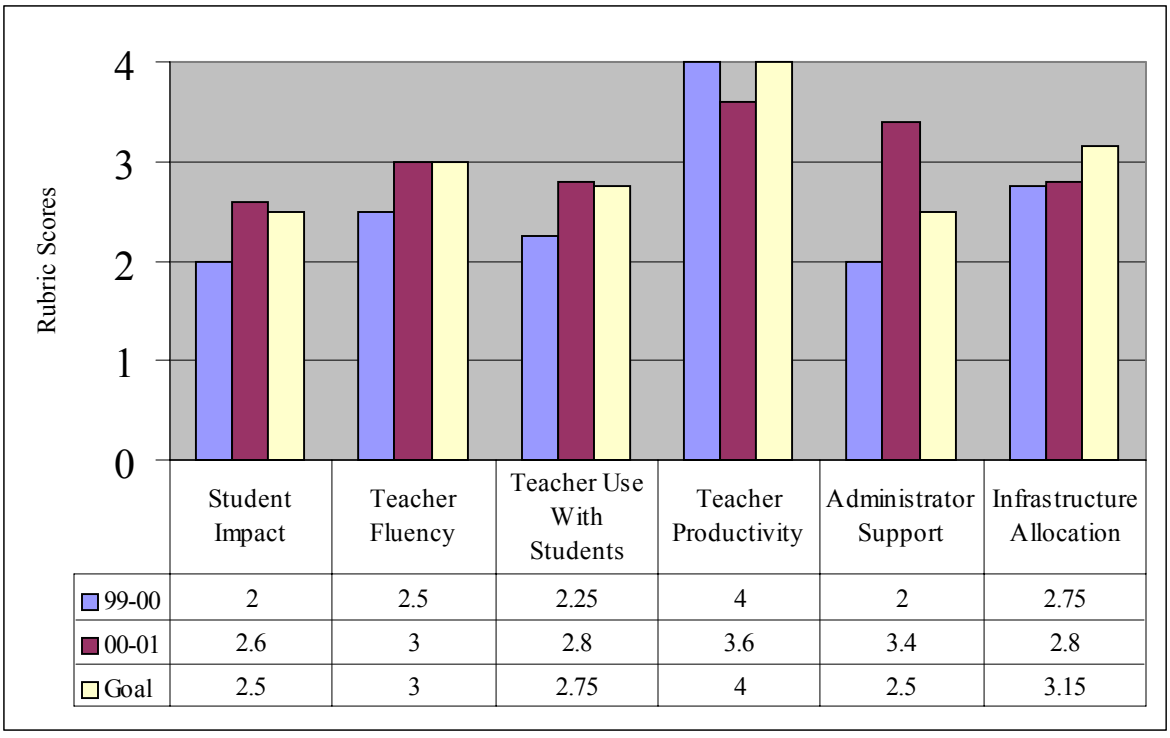
Last year, the Fayette County Public Schools undertook a process to answer several basic evaluation questions related to instructional technology implementation. They are:

1. How have students been impacted by technology integration?
2. Are our teachers using technology in ways that match both our district goals for technology use and the potential that exists for technology as an instructional tool?
3. Have we adequately allocated district technology resources so that students and teachers can realize the resources' potential?

That process resulted in a district technology assessment that was presented to the Board of Education on February 14, 2000. The Board requested that the assessment be repeated yearly to gauge progress. The present report is the first of those follow-ups.

The chart below provides an overview of results from the 00/01 District Technology Assessment (DTA). The three research questions above are represented on the chart by (a) student impact, (b) the next four areas which generally deal with teacher impact, and (c) infrastructure allocation. Within each area, the first bar represents district-wide performance in 99/00, the second bar represents 00/01, and the third bar represents the goal for improvement that was established in the district's two-year consolidated plan.

Figure 1. Overall DTA Results



	Student Impact	Teacher Fluency	Teacher Use With Students	Teacher Productivity	Administrator Support	Infrastructure Allocation
99-00	2	2.5	2.25	4	2	2.75
00-01	2.6	3	2.8	3.6	3.4	2.8
Goal	2.5	3	2.75	4	2.5	3.15

Based on the above data, the district is making significant progress in student impact, teacher fluency, teacher use with students, and administrator support. In fact, the district has already met or exceeded the

consolidated plan goals for those areas after just one year. Teacher productivity declined somewhat, but that decline is thought to be due to adjustments in data rather than any actual decline. Infrastructure allocation lags behind other areas and this report provides suggestions for how to improve in that area. New in this year's DTA, there are additional data on specific uses of technology that impact student achievement. Those additional data are explained in more detail in the report, and they indicate that technology is having a positive impact on student achievement. The report concludes with a set of recommendations that are summarized below.

1. Continue increasing the use of classroom computers, while maintaining the functionality of computer labs.
2. In PD, continue emphasizing that technology is a tool that supports all instruction, rather than a "skill" in and of itself.
3. The Kentucky Department of Education is expected to release a set of technology standards for administrators in the near future. Once those standards are released, the district should adopt them.
4. Continue the innovative PD practices that have been added within the past two years. Those include, but are not limited to (a) imbedded PD in which TRTs work directly in classrooms with teachers. (b) PET Project, (c) Online PD, (d) Individualized PD for teachers, and (e) increasing the number and quality of PD offerings in the Ambrose lab.
5. Discontinue the practice of teachers "dropping students off in the computer lab."
6. Continue addressing SBDM councils about their schools' use of technology.
7. Continue working on improvements to the infrastructure. This may be the single most important recommendation, because it drives everything that schools do with technology. As discussed in the section on "technology resource allocation", schools have consistently requested an increase in TRTs and technicians. Now there is evidence that the investments the district and individual schools have already made in those personnel are improving student achievement.

Introduction and Review of 99/00 District Technology Assessment

This report describes results of year two of the Fayette County Public Schools (FCPS) District Technology Assessment (DTA). The Board of Education requested that an assessment be conducted by a third party evaluator during the 99/00 school year and that it be updated annually in order to gauge progress. The annual updates are to be conducted by internal staff. The DTA was designed to address three fundamental research questions:

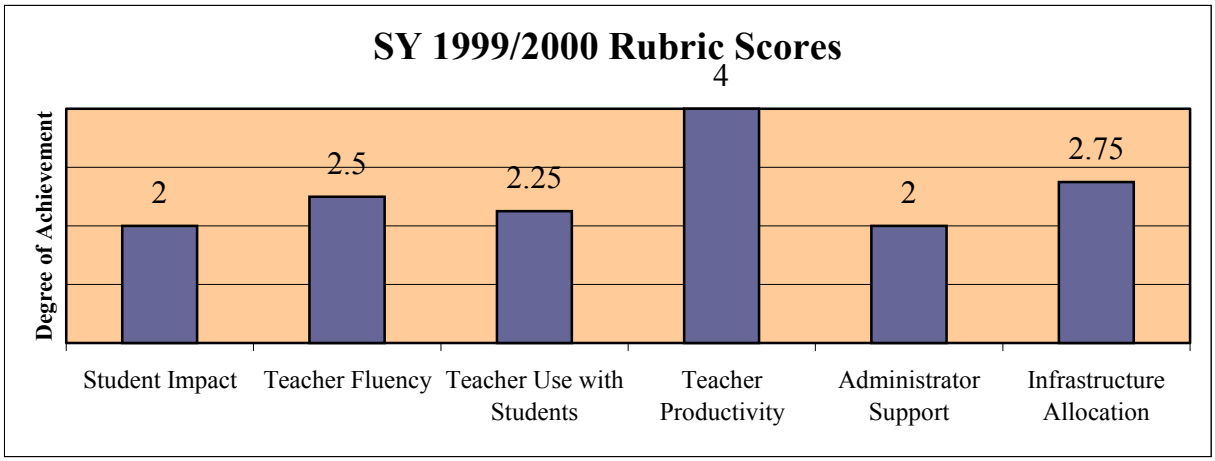
1. How have students been impacted by technology integration? Has technology improved student achievement, had no impact, or perhaps negatively impacted achievement?
2. Are our teachers using technology in ways that match our district goals for technology use and the potential that exists for technology as an instructional aid?
3. Have we adequately allocated district technology resources so that students and teachers can realize the resources' potential?

99/00 DTA

The excerpt below is from Fayette County Public Schools: A Formative Assessment of Educational Technology, February 2000, by Sun Associates.

The following chart shows how the district scored on its various indicator rubrics in 99/00. The numerical scores are on a scale of 1 to 4, where 1 represents a minimum level of achievement and 4 represents the highest degree of achievement.

Figure 2. 99/00 Results



Fayette County views its technology evaluation within the broad context of educational change and improvement. The greatest value in this evaluation process, even at the classroom teacher and department levels, is the reflection that the process inspires. The development of indicator rubrics requires that teachers and administrators spend considerable time examining and defining what constitutes "success" in their efforts to integrate technology into teaching and learning.

In terms of its key evaluation questions, FCPS has for the most part scored in the mid-range of its indicator rubrics. Specifically:

- *Students use some technology nearly every day in relation to learning activities. The primary emphasis of technology use is still in the acquisition of basic skills, but there is evidence that the student is beginning to use technology to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge and communicating results. The vast majority of student technology use is teacher-directed, with students assigned to use particular technology tools, applications, or resources as part of their academic work.*

- *Teachers are basically fluent in common technology productivity tools such as word processors and the WWW. The majority of teachers are using basic technologies to support traditional instructional models. Nevertheless, the teacher fluency indicators developed by the district evaluation demand a level of technology appropriation much higher than what was found.*

- *The largely traditional instructional models employed by the majority of FCPS teachers do not encourage or allow them to reach high levels of achievement in the district's rubric relating to how teachers use technology to inspire student learning. This rubric demands that teachers use technology to empower students as engaged learners. More than anything relating to technology, this expects teachers to teach in ways far different than how we believe many FCPS teachers currently work.*

- *FCPS teachers are skilled in the use of technologies as productivity tools. Given the relative new-ness of networked technology in many schools, we find this degree of adoption remarkable.*

- *The district's network infrastructure is largely, if not "fully", complete. Computers are in students' "places of learning" throughout the district, but not necessarily in sufficient numbers to achieve optimal impact.*

- *Few schools have a full time technology resource teacher, but every teacher has at least some access to a person in a technology resource position.*

- *Teachers have access to appropriate software, but only recently have efforts been undertaken to map technology applications onto curriculum frameworks.*

Once again, it is important to note that these particular findings are really only truly relevant when considered in the context of the district's indicators of success for meeting our instructional technology goals. Each of the above findings references an indicator rubric designed to show where the district wants to go in terms of student impact, teacher fluency, and infrastructure/support.

The evaluation resulted in a number of specific recommendations in the areas of professional development and policy. Key among these were:

Professional Development

- *Teachers need to develop a greater understanding that integrating technology involves concurrent changes in instructional practice and classroom management. If more teachers embraced models of cooperative learning, individualized instruction, and student-centered approaches to learning then*

they would surely realize more opportunities to use classroom computers. It will take significant professional development resources to help these teachers adopt new approaches. Simply creating mandates for change without supporting change will not suffice.

- *The district should develop stronger messages concerning the purpose and value of technology integration. Too many teachers only understand technology as a "skill" to be mastered and not as a tool for transforming learning. Professional development which emphasizes the transformative value of technology will help teachers understand the role that technology has within the existing curriculum. It will also help teachers understand how as grade and subject area instructors they can play a greater role in encouraging student use of technology tools.*

- *The district should organize technology professional development specifically for building administrators. The main goal of this training would be to transmit the message that technology is both a tool and catalyst for creating pedagogical change.*

- *The district should create a district-wide technology professional development plan which emphasizes and develops additional models for addressing the increasingly complex mix of teacher technology skills and interests. Also, it is critical that the district remember that the largest barrier to technology use is pedagogy, not technology "skills."*

Policy

- *Teachers at all levels should be more active participants and pedagogical guides to their students' time in school computer labs.*

- *Site based councils must become better educated and informed on the values of instructional technology as a tool for learning. Since these bodies control much of what happens in a school visa vis policy and budget, there is a distinct limit on the impact that "district wide" policy can have on issues such as staff expectations, technology staffing, and expenditures of KETS and school funds for technology.*

- *Technical support needs to be increased at the building level.*

- *Parents should be more involved with their children's technology use in and out of school.*

Actions Resulting from 99/00 DTA

Since the Sun Associates report was released in February 2000, the district has undertaken a host of initiatives to address the recommendations above. Many of the initiatives are reflected in the district Consolidated Plan while others are simply reflected in the daily activities of staff. Specific data and information on those initiatives will be described in this report. The report also provides a direct comparison of data from last year to this year, as a yardstick of progress.

Procedures

As part of their agreement with FCPS, Sun Associates provided the district with all the materials and procedures necessary to replicate its original assessment. As much as possible, those same procedures were followed in the 00/01 DTA. In some cases, the procedures were further refined in order to (a) make

adjustments that Sun Associates recommended or (b) improve the reliability and validity of last year's procedures. The majority of this year's data were derived from three main sources:

1. An online survey
2. Classroom observations
3. Focus groups

Certain strengths and weaknesses are associated with each of the three methods of gathering data. For example, even though classroom observations allow assessors to record specific teaching and learning behaviors in a real-life setting, they are plagued by the fact that they only give the assessor a snapshot of what actually occurs in the classroom throughout the school year. That weakness is balanced out by the fact that the online survey and the focus groups both give the assessor a broader, yearlong view of teaching and learning behaviors. The process of balancing three types of data collection procedures to compensate for certain weaknesses is known as "triangulation."

Online Survey

An online survey of teachers was conducted between November 20 and December 8, 2000. All teachers were asked to complete the survey in a computer lab during a regularly scheduled staff meeting. The survey normally takes 10 minutes or less to complete.

Individual survey responses by teachers were kept confidential, so teachers would feel able to express themselves freely. However, at the request of SBDM councils, their school's cumulative survey results may be reported to the council as a means for suggesting school-wide improvements in technology implementation.

At the suggestion of Sun Associates, two items were added to the 00/01 survey that were not included in the 99/00 survey. They were "12. Software for testing student achievement (e.g., STAR Math or SRI)" and "54. The administrator in my school is supportive of technology." Also, four items were changed in order to clarify the questions. In the original survey, it was possible for a teacher to inadvertently select a response they did not intend to select. That was corrected this year. The complete list of survey items can be seen in table 2 in the results section, and the changed items are indicated in that table.

Classroom Observations

Classroom observations were scheduled between November 27 and December 15, 2000 to provide more direct data on technology progress. A few observations were rescheduled for early January at the request of schools that were testing during the November/December period. Technology Resource Teachers (TRT) conducted the observations, concentrating on classroom activities that relate to the rubrics developed for the baseline DTA. The observations were done in 104 classrooms in 12 elementary, 5 middle, and 4 high schools.

In any educational research, it is important to take steps to ensure "reliability" of data collected in classroom observations. That is, it is important to safeguard against the possibility of the observer missing important information or recording information inaccurately. Several steps were taken to counteract any potential "human error" problems. Each TRT was paired with another TRT, and they compared notes after their observations to be sure they agreed on what teaching and learning behaviors they saw. Everyone used the same observation forms (see appendix 3) and the forms were designed to facilitate collecting as much objective data as possible. Every attempt was made to avoid subjectivity.

The TRTs were assigned to observe in schools where they don't normally work, as a way to avoid any potential biases. TRTs received training on how to use the observation forms, and then conducted a trial run, to make sure the forms were used correctly.

In each participating school, the School Technology Coordinator (STC) was asked to identify two classrooms where they feel technology is being used most effectively. Two additional classrooms were identified randomly. One additional observation was done in the school's computer lab. That mix of settings was intended to show the best the school has to offer in technology, balanced with typical use of technology. It also gave both the classroom and lab views. However, the emphasis was definitely on classroom observations rather than computer labs because that gives a more realistic view of a student's typical daily schedule. The observations lasted 30 to 60 minutes each.

Focus Groups

Focus groups were held to further clarify the survey and observation data. They were facilitated by the KETS Coordinator for the Kentucky Department of Education's Region 5 Service Center and by the FCPS Coordinator of Instructional Technology. The focus group questions are in appendix 2. The groups consisted of:

- School Technology Coordinators
- Technology Resource Teachers
- Elementary Classroom Teachers
- Secondary Classroom Teachers
- Principals

Timeline

Table 1. Data Collection Timeline

Activities	***Week Of***								
	11/6	11/13	11/20	11/27	12/4	12/11	1/8	1/15	5/14
Trial-Run Observations									
Surveys									
Observations									
Focus Groups									
Final Report to BOE									

Results

Online Survey

Seventy percent of the teachers in the district completed the survey. That 70% return rate is much higher than researchers typically achieve, which may indicate that FCPS teachers are strongly committed to providing information about technology progress in their schools. Whatever the reason, our teachers are to be commended for responding in such high numbers. The high return rate is also an indication of the sophistication of the district's technology infrastructure. The surveys were done online. Without a robust infrastructure of computers and a wide area network, the surveys could not have been completed in the first place. That speaks to research question number 3, dealing with technology infrastructure. Results of the surveys are in table 2, below.

Table 2. Summary of Responses from District Technology Assessment Survey

Item	Percent Responding Yes	
	99/00	00/01
How has technology impacted your students' achievement?		
1. Technology increases my students' motivation	88%	92%
2. My students use technology to acquire basic skills	63%	69%
3. My students use technology to become more critical thinkers	51%	58%
4. My students use technology to help them construct new knowledge	68%	72%
5. My students use technology to solve relevant, real-life problems	45%	48%
6. My students use technology to discover concepts and prove relationships	41%	46%
7. My students use technology to communicate knowledge and information	76%	82%
Please check all of the technologies which you employ with your students.		
8. Word processors	51%	67%
9, Integrated learning systems (e.g., Jostens, Writing to Read, etc.)	15%	8%
10. Spreadsheets	23%	24%
11. Tutorial and basic skills development programs	64%	54%
12. Software for testing student achievement (e.g., STAR Math or SRI)	N/A	61%
13. Special applications for reading, math, etc. (e.g., Accelerated Reader)	55%	56%
14. Electronic mail	23%	32%
15. World Wide Web/Internet	66%	75%
16. Presentation software (e.g. PowerPoint)	30%	43%
17. HyperStudio or other multimedia software	7%	18%
18. CD-ROM encyclopedias	49%	47%
19. Graphing calculators	11%	11%
20. Probes for data acquisition (temperature, mass, etc.)	9%	10%
Settings where my students primarily use technology		
21. All	26%	30%
22. Full class	19%	26%
23. Small group	10%	13%
24. Singular (original default)	41%	29%
25. None at all	4%	2%
The following questions deal with your own use of technology		
26. I use technology applications such as word processors and spreadsheets to produce materials for use with my students.	88%	90%
27. I use on-line (WWW) resources to find materials relevant to my curriculum.	82%	89%
28. I use presentation software and hardware within my classroom.	43%	50%
29. I use e-mail to contact peers and experts both inside and outside of the district.	91%	94%

Item	Percent Responding Yes	
	99/00	00/01
30. I use e-mail to communicate with parents and students.	49%	72%
31. I use technology to maintain student records (e.g. attendance, electronic gradebook).	64%	79%
32. I use technology to monitor student performance (e.g. electronic portfolios).	29%	30%
33. I believe that I can recognize the ethical use of technology.	90%	93%
34. I model the ethical use of technology with my students.	78%	81%
35. My building technology coordinator has helped me implement the district technology standards.	70%	77%
36. My building technology coordinator has assisted me in finding ways to integrate technology within my curriculum.	62%	72%
37. District-level technology resource teachers have assisted me in implementing standards and integrating technology.	47%	60%
I use a variety of teaching strategies which incorporate technology use this often.		
38. Seldom	21%	21%
39. Weekly	32%	40%
40. Several times a day (original default)	24%	12%
41. Daily	20%	26%
42. Never	2%	1%
The learning activities I develop require students to use technology this often.		
43. Seldom (original default)	30%	20%
44. Sometimes	47%	51%
45. Frequently	20%	27%
46. Always	3%	3%
Please estimate the percentage of your written communication (to all individuals in the course of your professional work) that takes place electronically.		
47. 100% (original default)	12%	7%
48. 95%	24%	29%
49. 75%	28%	30%
50. 50%	18%	20%
51. 25%	15%	13%
52. None	3%	1%
53. The technology plan for my school is "frequently monitored".	86%	96%
54. The administrator in my school is supportive of technology.	N/A	98%
55. The administrator in my school is involved in technology professional development.	65%	94%

- Response rate for both years was approximately 70%.
- Line numbers 24, 40, 43, and 47 were default selections in a drop-down menu on the 99/00 survey and may have been over-represented that first year. In other words, if a teacher skipped over the question, this choice was automatically selected, as though the teacher had intended to select it. Those items were changed in 00/01 so the default was "no selection".
- Items 12 and 54 were not part of the survey in 99/00. They were added in 00/01.

As discussed previously, each of the methods of data collection has certain strengths and weaknesses. One strength of surveys is that they can provide a global representation of performance. For example, the DTA survey covers the majority of teachers in the district and it encompasses the totality of their instructional program -- not just one lesson or one subject. A potential weakness is that survey ratings are based upon opinions. Usually those opinions are an accurate representation of instructional practices, but there is room for error or misinterpretation of survey questions. With those caveats in mind, the survey revealed that the district is making good progress in nearly all aspects of instructional technology.

Table 2 shows the percent of teachers who responded "yes" to each of the survey items in 99/00 vs. 00/01. Items 1-7 represent teachers' perceptions of impact on student achievement. The items are important in that they correspond to instructional practices that have been shown to promote student achievement. Of

particular importance are items 3-7, because they deal with practices that promote more challenging instruction for students. All items in this area improved from 3 to 7%.

Items 8 – 20 deal with the variety of forms of technology that students use. Nearly all of those increased, with some of the largest increases occurring in items 8, 14, 15, 16, and 17. Those five items deal with accessing information via the Internet and then presenting information either in text form or via presentation/multimedia software. In other words, the largest increases seem to be in uses that promote communication. That is a particularly positive finding. On items 9, 11, and 18, there were actually decreases. In this case, a decrease is good. All three of those items represent low-level uses of technology that tend to be less challenging for students.

Most education technology professionals agree that, to implement technology effectively, it should be used in a variety of instructional settings and with various sizes of groups. Ideally, the percents for items 22 through 24 should be evenly distributed. They are fairly well balanced between full class (item 22) and singular (item 24), but relatively low for small group (item 23). That may be a function of the overall instructional approach the majority of teachers use (i.e., not just related to technology). That was an observation that Sun Associates made in their 99/00 assessment and it still seems to hold true. Unfortunately, it's not possible to make an accurate comparison from one year to the next in this category, because of the error pointed out earlier in item 24 on the 99/00 survey. This will need to be monitored in the future when a better comparison can be made.

Items 26 – 34 deal with teachers' own use of technology. All of those items increased, indicating that our teachers continue to make strong progress in their own use of technology. The most impressive increase was in item 30, "I use e-mail to communicate with parents and students." Over the past year, teachers have increased this type of communication by 23%. That has obvious positive implications for home – school communications and parent involvement. We see an increasing number of teachers maintaining closer contact with parents due to the convenience and reliability of e-mail. The down side is that communication usually does not occur with parents who do not have access to e-mail either at home or at work. However, national data indicate that home access to email increases every year, and some of the largest increases now are occurring in low-income homes. One might draw a parallel to telephones. When telephones were first invented, very few homes had them. But they steadily became more common in homes, and are now found in the vast majority of homes. The same increase seems to be happening with computers and e-mail, except more quickly than it did with telephones.

Support staff are a vital part of the technology infrastructure, and items 35 – 37 address support staff. Again, there were substantial increases on all three of those items, indicating that both school-based and district technology staff are doing a good job of providing the kinds of assistance needed to help teachers better integrate technology into their instruction. Since the original evaluation was conducted in 99/00, there have been efforts in the district to use support staff to help address instructional recommendations made by Sun Associates. It appears that those efforts are paying off.

Items 38 – 46 represent how much teachers use instructional technology. The data indicate that 78% of our teachers use teaching strategies that incorporate technology at least weekly. Out of those teachers, 38% do so one or more times a day. In the past year, the district has significantly increased the amount of professional development focused on practical classroom-based uses of technology. It is anticipated that technology integration will continue to increase as a result of the improvement in how training is provided.

Based on items 47 – 52, it appears that FCPS teachers use e-mail for a significant portion of their written correspondence. That was found to be true in the original Sun Associates assessment, and it is still true.

A cause of concern in last year's DTA was what Sun Associates perceived as a lack of support for technology among building level administrators. This was certainly not across the board, but there were a few striking examples of teachers saying that their building administrators did not support them in their use of technology, and in some extreme cases may have actively discouraged the use of technology. Based on this year's survey, that problem seems to have been corrected. Items 53 – 55 deal with administration. According to item 53, it appears that technology plans are now monitored more frequently. According to item 55, it seems that building administrators are far more involved in technology professional development, with and increase from 65% to 94%. Item 54 "the administrator in my school is supportive of technology", was added this year, so no comparison can be made with last year. However, the rating of 98% indicates a high degree of support. These data are very encouraging, because it is important for the leadership in each school to be supportive if teachers are to continue improving in their integration of technology.

Classroom Observations

Several types of data were collected during classroom observations, as a way to verify and further elaborate on results from the online surveys. Observers also provided comments and descriptions of specific instructional activities. The data collection forms that were used in 99/00, were used again in 00/01 without changes. Also, a new form was developed for 00/01 that provided more objective data. It is important to keep in mind that these observations were only conducted in 104 classrooms in the district, so this is only a representative sample. Therefore, there is room for error. Total district data are probably a more accurate representation than data for individual levels, because the total sample was larger than the samples for individual levels.

One type of observation data was based on stages of teacher behavior that were identified in conjunction with the Apple Classroom of Tomorrow (ACOT) study (Apple Computer, 1996). That 10-year study was one of the most comprehensive evaluations dealing with educational technology, and the resulting stages are considered some of the best indicators of effective teacher behavior. Those stages are:

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 graphic tools.
Appropriation	Teachers focus on cooperative, project-based, and interdisciplinary work which 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.

As part of the DTA classroom observations, the teacher behaviors above were observed in order to determine where our teachers stand in the continuum. The following table shows how our teachers were rated.

Table 3. ACOT Ratings for Observed FCPS Teachers

	Total District		Elementary		Middle		High	
	Number	**Percent**	**Number**	**Percent**	**Number**	**Percent**	**Number**	**Percent**
TOTAL	86		50		19		17	
Entry	16	19%	8	16%	4	21%	4	24%
Adoption	33	38%	24	48%	5	26%	4	24%
Adaptation	21	24%	13	26%	5	26%	3	18%
Appropriation	16	19%	5	10%	5	26%	6	35%
Invention	0	0%	0	0%	0	0%	0	0%

These data are useful for the total district and at the elementary school level. However, there should be some caution in interpreting the data for middle and high schools, because fewer teachers were observed at those levels and there is greater room for error. District wide, we see the largest number of teachers at the adoption stage (38%), but showing indications of moving forward into the adaptation stage (24%). This appears to be an improvement over last year, when our teachers were more firmly in the adoption stage. At the elementary level, teachers are more concentrated at the adoption and adaptation stages, with fewer teachers at the low and high ends of the continuum.

Overall, this is a "healthy" range for our teachers. In the ACOT study, it took teachers ten years to progress through the stages and many did not reach the highest stages. In FCPS, technology has only become prominent in our schools within the past two to four years, so it is reasonable to expect that our teachers would be at the adoption/adaptation stage and apparently showing progress toward higher stages.

In the 99/00 assessment, Sun Associates emphasized the need to increase the amount of student-centered instruction. Technology tends to be more effective when used in a student centered learning environment than in a teacher directed learning environment. That recommendation is in keeping with instructional practices promoted in Kentucky since the advent of the Kentucky Education Reform Act (KERA). The data below indicate the number of classrooms where instruction was (1) mainly student centered, (2) a mixture of student centered and teacher directed, or (3) mainly teacher directed. These observations are based on the overall instructional approach employed in the classroom, and not just the approach employed in relation to technology. While all three approaches are appropriate at different times, depending upon the lesson and the needs of students, the 99/00 DTA indicated that our teachers place too much emphasis on teacher directed instruction and not enough on the other two approaches.

Table 4. Student Centered vs. Teacher Directed Instruction

Level	Instructional Approach	Number	Percent
Elementary	Student Centered	15	21%
	Mixed	33	47%
	Teacher Directed	22	31%
Middle	Student Centered	10	42%
	Mixed	8	33%
	Teacher Directed	6	25%
High	Student Centered	7	35%
	Mixed	4	20%
	Teacher Directed	9	45%
Total	Student Centered	32	28%
	Mixed	45	39%
	Teacher Directed	37	32%

The new data for 00/01 seem to indicate a relatively even mix of the three approaches. In elementary schools, mixed instruction was the most prevalent approach. That is appropriate, given the fact that elementary students tend to need more frequent changes in activities. In the elementary classrooms that were observed, many teachers would introduce a concept with a large group and then divide students into small groups or have students working independently on related activities. Only 31% of the elementary classrooms engaged entirely in teacher-directed instruction. Instruction in the high school and middle school classes also tended to be evenly mixed, though mixed activities were a little less prevalent. At 45%, the high schools had the highest percentage of teacher directed lessons.

There were two concerns in the 99/00 DTA that related to physical arrangement of classrooms. Sun Associates found that the district tended to place too much emphasis on computer lab instruction and not enough on classroom use of technology. Sun also noted that some classroom computers were inaccessible to students and had been designated solely for teacher use. Sun indicated that before computers may be used effectively, they must be located where students can access them, and in such a way that they promote student centered instruction in which students are actively involved in guiding their own learning. The following data address characteristics of the physical arrangement of classrooms that may promote more effective use of technology. These data deal only with observations that were done in classrooms -- not in computer labs. Of the total 104 observations, 84 of them were in classrooms.

Table 5. Physical Arrangement of Observed Classrooms

Schools	There is more than one computer in the classroom.	Classroom computers are properly connected and have access to the network.	Computers are located where students can use them.	Classroom is arranged so students can work in small groups or individually.	There is a projection device in the classroom and it is operational.	There is evidence of technology-based student work on display in the classroom.
All Schools					n = 84	
Number	66	80	72	74	37	24
Percent	79%	95%	86%	88%	44%	29%
Elementary					n = 49	
Number	42	48	46	44	23	14
Percent	86%	98%	94%	90%	47%	29%
Middle					n = 19	
Number	14	16	13	15	7	4
Percent	74%	84%	68%	79%	37%	21%
High					n = 16	
Number	10	16	13	15	7	6
Percent	63%	100%	81%	94%	44%	38%

District-wide, 79% of observed classrooms had more than one computer. There were more classroom computers in elementary schools and fewer in middle and high schools, respectively. The overall distribution of computers is fairly even among different levels of schools, but our middle and high schools tend to place more of their computers in labs, leaving fewer for classrooms. Nearly all of the computers were properly connected. The few that were not, were mainly in middle schools. Since having computers connected is strictly a technical matter, this may indicate the need for increasing technical support in middle schools. That is a need the district is aware of, and the Consolidated Plan recommends increasing the number of local area network (LAN) technicians in middle schools.

Computers were most accessible to students in elementary school classrooms, less accessible in high schools, and least accessible in middle schools. For the most part, computers were located where they may be used for small group or individual instruction. Again, middle schools lagged behind elementary and high schools in that regard.

In order to be used for large group instruction, classrooms should be equipped with some sort of device that allows the whole class to view a computer at the same time. That could be either an LCD projector or a scan converter. LCD projectors provide a much higher quality image than scan converters, but they also cost considerably more. Due to those limitations, one would not expect many classrooms to have devices. Yet, 44% of our classrooms do. That is a credit to schools that are investing in making their classroom computers more usable with large groups. As prices decrease and quality improves, those devices will most likely become more widely used in our schools. Some resourceful teachers also find ways to simply gather large groups of students around a standard computer monitor.

Literature on school climate indicates that it is important to display student work in classrooms. That promotes student pride in their work and emphasizes the fact that student work is valued. Overall, only 29% of observed classrooms had technology-based student work on display. That includes work such as

documents students have written, charts they have created on computers, results of Accelerated Reader activities, art that students have created on computers, etc. Our students create a significant amount of work with computers, so it will be a simple matter to increase the amount of that work that is displayed. It is hoped this category will increase significantly next year.

Below are samples of observers' narrative and comments:

- High School Geometry: *Using a SmartBoard, the teacher introduced investigating triangle congruencies. Students then solved problems independently and in small groups. Then they demonstrated their solutions using the SmartBoard.* SmartBoard is a projection screen that allows the presenter to remotely control computer images from the screen. This is an example of a class where mixed activities occurred.
- 2nd/3rd Grade Language Arts/Social Studies: *Class is in center for language arts. One group is looking up definitions of words using Dictionary Plus on Discover.com. Another group is using Inspiration to web out spelling words and categorize them according to spelling patterns. A third group is using Yaholligans.com to research holidays around the world. A fourth group is creating and coloring calendars. The last group is typing personal narratives using Microsoft Word*. This is an example of a 2nd/3rd grade class engaged in individual and small group activities, most of which involve technology. It was in a double room in which each teacher had access to all computers per arrangement with the other teacher. There were 8 computers altogether. It was noted that the students were highly engaged and working well independently, with the teacher circulating and facilitating the groups. The classroom arrangement was innovative because it allowed both classrooms to effectively double the number of computers in the classroom by sharing them.
- Middle School Science: *Students were using Texas Instruments probes and calculators to record and store pH and temperature data of a closed environment of fish and plants. Two students were completing a previous assignment on the website www.cellsalive.com.*
- 1st/2nd Grade Language Arts and Math: *The teacher showed us a disk that had digital pictures…. We were unable to see the pictures because the computer was locked by Fortres and we were not able to access the disk.* Fortres is a program that effectively "locks" the computer or parts of the computer and prevents people from using it. This is a security measure that apparently went too far in this case, because it prevented the teacher from using the computer for instruction.
- High School Humanities: *The teacher is showing students a variety of paintings from the Internet using a projector and SmartBoard. Students recorded notes and discussed the paintings.* In this example, the teacher was able to use the Internet to access paintings from around the world and display them in a way that allowed all of her students to view and discuss them at the same time.
- 2nd Grade Language Arts: *The teacher introduced students to www.*bookadventure.com. *She led the group in a practice quiz over Charlotte's Web.* This is an example of a small teacher-led group in a 2nd grade class using the Internet to work on reading comprehension. The questions on the website were similar to SRI questions, so it was an opportunity to practice answering inferential questions about a book that all the students had read. The website required each student to have a username and password, so the teacher embedded a lesson on selecting and using appropriate computer usernames and passwords. She discussed the fact that students all over the world would use the website and that her students would have to select original words that had not been used by anyone else.
- 7th Grade Science: *Students were watching a video presentation from the Holiday Lecture Series on Genetics. Students were completing a KWL chart on the presentation. Students would periodically get up to the computer to send questions to the presenter via a simultaneous web*

broadcast. Other schools across the country and in Russia were participating in the discussion, asking questions via teleconferencing.

Focus Groups

The focus groups provided useful information because they allowed for more in-depth discussion of topics that participating groups felt were important. The focus group questions are in appendix 2. Below are representative comments from those groups. All the comments were taken into consideration in arriving in overall rubric scores for the DTA.

School Technology Coordinators

- *Keyboarding has improved student writing.*
- *Technology helps us reach students with different learning styles.*
- *Students with disabilities can do more than before.*
- *When students are using technology to write for websites and presentations, they realize they will have a wider audience than before, so they become more aware of their audience. That changes the value they place on their work.*
- *Technology removes the isolation of the classroom.*
- *In middle and high schools, teachers rely a lot on computer labs for their instruction with technology, and it can sometimes be hard to get time scheduled in the labs.*
- *There is not enough on-site technical support. Schools need someone to help with technical problems and someone else to help with instructional support for teachers.*
- *Teachers see technology as an add-on; not in support of what they are doing.*
- *Online PD is supported by the staff*
- *The most useful technology training has been(a) one-on-one with TRT and (b) the PET Project*

Technology Resource Teachers

- *Lab instruction is too often just rote learning. Teachers need to be more involved.*
- *High school teachers are resistant to classroom computers for instruction.*
- *Kids who are typically "problem kids" pay more attention and have better behavior when using technology. It impacts both behavior and learning in positive ways.*
- *With kids who are struggling, technology can level the playing field.*
- *It's hard to talk about this in general terms, because there is huge variation among students and teachers. There are big successes and disappointing failures.*
- *It allows kids to be better readers at an earlier age. Kids are forced to read when using computers. But that can also hold kids back.*
- *Technology allows even young children to produce products that are on par with college students.*
- *There doesn't seem to be a connection between how much a teacher knows about technology, and how much they use it in their classroom.*
- *Departments have started buying their own SmartBoards and other technology because they have greater demand than in the past.*
- *There aren't enough hours in the day. I walk down the hall and 10 teachers grab me.*
- *Need full time positions in schools.*
- *We're always last. Bowling alleys had overhead projectors first. Every lane in the bowling alley has its own computer, but not every student has their own computer.*

Elementary Classroom Teachers

- Ways students typically use lab or classroom computers:
  - *Internet searches*
  - *Portfolios*
  - *WiggleWorks*
  - *Creating tables and graphs*
  - *Using Inspiration or Kidspiration to create graphic organizers*
  - *Integrating content studies with research skills*
  - *Webpage design*
  - *Accelerated Reader*
  - *Reading Counts*
  - *E-mail*
  - *Museum research*
  - *Language translation*
- *With the Internet, we provide our students with more to read than if they just had the library.*
- Teachers were asked what percentage of their students had access to computers at home. The average was 55%.
- Teachers were asked their impressions of what impact technology has had on their students:
  - Increased reading and math scores
  - Improved problem solving
  - Greater motivation for learning
  - Wider resource selection
  - Huge library from which to draw information
  - Increased study skills
  - Improved ability to find content
  - Instruction is still hampered by slow speed of technology
  - Benefits students who need greater challenges for learning.
- Teachers were asked what technology allows their students to do now that they would not have been able to do without technology:
  - Visiting the world
  - Increased global perspective
  - Benefits students who desire additional information or learning opportunities
  - More student directed learning
  - Improved references and life experiences
  - Easier to display the past for students
- Teachers were asked what changes could be made to technology in their school which would allow they students to benefit more from technology:
  - More computers
  - More diverse kinds of technology such as SmartBoards, Computer microscopes, etc.
  - More wireless computer labs
  - More projection devices
  - Opportunities for teacher education and planning
  - More certified technology staff
- All teachers indicated they had computers at home.
- Teachers were asked what barriers they have encountered in trying to use technology in the classroom:
  - Outdated equipment
  - Lack of training for teachers and staff

- Lack of time for teacher practice and repetition
- Lack of higher level training
- Fear level among some teachers
- Belief among some teachers that old ways are the best
- Lack of funding for small technology needs such as ink, cables, etc.
- Slow turnaround time on repairs
- Spending personal money instead of school money

- *I would like to see less paper used in my school, and more "virtual documents."*
- *Not enough TRTs to go around.*
- *No technology grade on report cards*
- *There is plenty of technology PD being offered, but not enough time to get it all in. The best way for us to get PD is by having TRTs work with us in the classroom.*

Secondary Classroom Teachers

- Ways students typically use lab or classroom computers:
  - *Portfolios*
  - *PowerPoint presentations*
  - *Creating graphs and charts*
  - *Problem solving with Excel for statistics*
  - *Creating web pages*
  - *Researching with the Internet and online databases using Kentucky Virtual Library*
  - *Desktop publishing*
  - *Teleconferencing (rare, but it goes on)*
- Teachers were asked what percentage of their students had access to computers at home. The average was 65%.
- Teachers were asked their impressions of what impact technology has had on their students:
  - Created a whole different way of doing research and gaining information
  - Whole new way of communicating
  - Has reached a population that might have dropped out if not for technology
  - Sparks an interest in school
  - Enables teachers to give students more feedback on their progress
  - Parent communication
  - A down side is we are creating a whole group of students who have trouble locating information in books. Students prefer to do everything on computer and not as much with books.
  - Enables teacher to spend time on higher order thinking. Tasks that used to be time consuming (e.g., statistics) don't take as long and you can spend more time working on the real meaning of the statistics.
  - Kids communicate with a much wider group of people with computers.
- Teachers were asked what technology allows their students to do now that they would not have been able to do without technology:
  - Allows students to express themselves more and not be embarrassed.
  - Kids are more confident in their work.
  - Through the Internet, students can participate in or experience real-time events (e.g., Journey to Mars). This has been possible through TV, but now it's interactive.
  - Can instantly talk to people who are actually practicing in the field.
  - Instant feedback from assessments (e.g., STAR Math, SRI, and Cornerstone)

- Teachers were asked what changes could be made to technology in their school which would allow they students to benefit more from technology:
    - More labs throughout the school OR more computers in individual classrooms
    - Trade antiquated equipment for new equipment. "I only have one ancient computer in my room."
    - We have equipment that is sitting idle for long periods of time because there are not enough technicians to fix them. The technical staff we have do a good job, but there should be more of them.
- All teachers indicated they have a computer at home.
- *Email has made me more accessible to parents. It also cuts down on the paper waste.*
- *There are inconsistent technology skills for students, depending on the feeder school.*
- *Morning announcements are done on the television instead of a voice in the air. More student-centered.*
- Other comments were similar to elementary teachers'

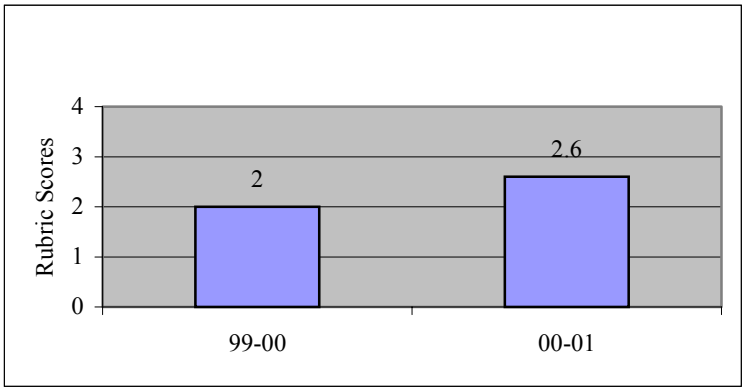
Principals

- There was a lot of variation among principals regarding how effectively technology is used in their schools. Most felt there was good use of technology, but one felt there was not.
- Principals estimated that 69% of their students had computers at home. They estimated that 85% of their teachers have computers at home.
- Principals were asked the same question as teachers about impact of technology on students. Most responses were similar to teachers, but following are some exceptions:
    - *Technology is an extension of what they are already doing – almost as though it is an expected tool.*
    - *Technology is most effective when it is tied into the real world.*
    - *Kids like school better because of technology, so you could assume that they do better in school.*
    - *You don't have to dash off to the library now and HOPE that the C encyclopedia is there.*
    - *Allows students to communicate with experts*
- *Technology forces teachers "out of their comfort zone" and makes them learn something new.*
- *We are converting from paper to paperless gradually.* An example of this that happened after the focus group… Principals now have electronic access to teacher applicant files so they can review applications, transcripts, references, and other pertinent information from their own computer without having to go to Human Resources to read through written files. They are able to instantly sort teachers by subject area and grade level. That process used to take hours.
- *Our teachers are posting classroom information on the Internet for parents to access.*
- *Technology increases my efficiency tremendously. If it can be done on a computer, I'm going to do it. If it can't, then I'll find somebody who can figure out a way to do it.*
- *Email provides you with a record of your communication.*
- *People will answer your email before they will answer your phone call.*
- *My laptop helps me be mobile and still able to do school work.*
- *I require technology to be incorporated in lessons for teacher evaluation.*
- *I lead by example as a way to encourage my teachers to better use technology.*
- *More technology staff are needed.*
- *I was amazed with kindergarteners and 1st graders installing my school's printers.*

Technology's Impact on Student Achievement

There is growing evidence that technology is having a positive impact on student achievement in FCPS. There was some evidence of impact in the 99/00 DTA. Since then, the district has implemented a number of new initiatives that appear to be increasing that impact. Based on the criteria that Sun Associates established for measuring student achievement impact, the district's score improved from 2.0 to 2.6 on a scale of 1 to 4. The score was arrived at by reviewing student impact data from the survey, observations, and focus groups and then matching those to the same rubrics that were used last year. See the rubrics in appendix 1. According to Sun, any score 2.0 or above should be considered "passing." So this increase is quite good in comparison with last year's score.

Figure 3. Student Impact



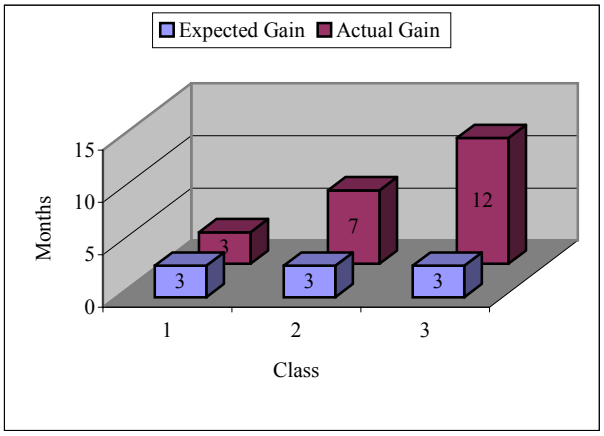
The rubric score provides an overall measure of impact. However, it is equally important to measure the effectiveness of specific uses of technology. The effectiveness of technology is not determined by what you have, but by how it us used. Technology is a tool – much like a book, a pen, a notebook, a globe, or a meter stick. Those tools do not affect student achievement by themselves. Student achievement is affected by how those tools are used by students and teachers.

With that in mind, we have undertaken to measure how technology is used by students and teachers in regard to specific applications. One such application is a program called Read 180, for grades 4-12. The purpose of Read 180 is to help 60 of the lowest performing students in a school to improve in the areas of:

- Reading decoding,
- Reading fluency,
- Creating mental images of text that is being read,
- Vocabulary,
- Relating text to content areas, and
- Motivation to read.

For more information on Read 180, see http://teacher.scholastic.com/read180/index.htm. During a pilot implementation at Cardinal Valley Elementary during the last half of the 99/00 school year, students achieved the following results.

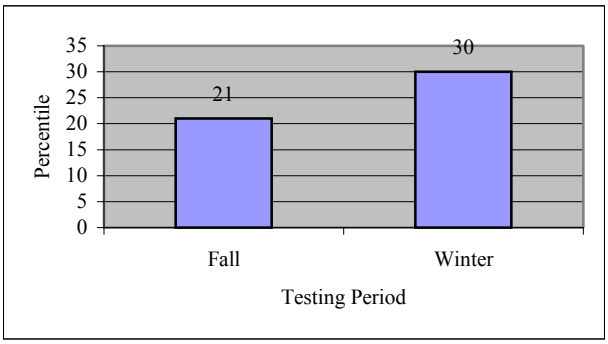
Figure 4. Cardinal Valley Pilot Read 180 Results



Three classes participated. Their reading level was tested at the beginning and end of the 3 month pilot. Typical students would be expected to gain 3 months in 3 months. Considering that these were some of the most challenged readers in the school, one could argue that they would be expected to gain even less than 3 months within the 3 month period of time. Their actual gains were greater than that. Class 1 gained 3 months in 3 months. Classes 2 and 3 exceeded expectations by gaining 7 months and 12 months respectively, during the 3 month period.

During the 00/01 school year, Read 180 was expanded to a total of 14 schools. Students were pretested using the SRI in August and September. A mid-year test was administered in January. The figure below shows those students' improvement in reading comprehension. Typically, students' percentile scores would be expected to remain fairly constant. The Read 180 students' percentile scores increased from 21%ile to 30%ile. The students will be tested again at the end of the year, at which time additional data will be available.

Figure 5. Total District SRI Scores for Read 180 Students



Considering the positive results in reading achievement realized so far, we hope to implement Read 180 in more schools in the future. More extensive data on national results are available at the following website: http://teacher.scholastic.com/read180/discover/research/results.htm#94. Those data suggest that our students will continue to make significant progress in reading.

In a review of research on the use of computers for testing, Russell and Haney (2000) found that students using computers may write better than students writing by hand. According to Russell and Haney:

Eighth grade students from two middle schools in Worcester, MA, were randomly assigned to groups. Within each subject area, each group was given the same test items, with one group answering on paper and the other on computer. In addition, data on students' keyboarding speed and prior computer use were collected. Finally, all answers written by hand were transcribed to computer text.

Large differences were evident on the language arts tests. For students who could keyboard moderately well (20 words per minute or more), performance on computer was much better than on paper. Overall, the difference represented more progress than the average student makes in an entire year and could raise a student's score on the MCAS from the "needs improvement" to the "passing" level.

Recalling that nearly ten million students took some type of state-sponsored written test last year and that nearly half of the students nationwide use word processors in school, these results suggest that state paper-and-pencil tests may be underestimating the abilities of some five million students annually.

That study has implications for writing among students in FCPS, especially considering the potential for improving our students' writing skills and test scores. As with any study, there are certain limitations. First, it dealt only with 8th graders, so it is difficult to say whether the same would hold true for other grade levels. Also, it dealt with the state assessment in Massachusetts, which is not the same as the state assessment in Kentucky. Notwithstanding those limitations, it is clear that Kentucky students are required to write significant amounts for our state assessment. Also, the Kentucky Department of Education recommends beginning keyboarding instruction in the 3rd grade, so students can be better prepared for the demands of writing at an early age.

With all that in mind, FCPS is beginning a more intensive push to improve keyboarding skills, starting in elementary schools. Keyboarding proficiency in important for our students, as a prerequisite for writing with computers. A summary of the district's approach to keyboarding instruction can be found at: http://www.fayette.k12.ky.us/instructtech/keyboarding.htm. That same site also links to KDE's standards for keyboarding. Some baseline data on students' keyboarding proficiency will be collected at the end of the current school year. Early data that we have already collected indicates some schools are being successful at improving students' keyboarding accuracy (improved from 61% to 92% at one school), but lagging behind in speed. Based on the Russell and Haney study, we should work toward students keyboarding 20 words per minute or higher.

Another way to view technology in terms of student achievement is by exploring the relationship between schools' performance on CATS and their use of technology. At the University of Kentucky, Allard and White (2000) conducted a study to compare CATS scores with data from library media reports. They examined certain characteristics found in the media reports, and how prevalent those characteristics were among the schools scoring in the top 20% and the bottom 20% on CATS. Parts of that report deal specifically with technology. Related to technology, Allard and White found that:

- *Schools in the top are much more likely to have Student Technology Leadership Programs than those in the bottom.*
- *Generally, the top schools at all levels share the characteristic that they have a higher level of technology to offer students than the bottom schools.*

For Fayette County's DTA, we conducted a similar comparison. Using CATS scores provided by KDE, all of the schools in the district were placed in rank order according to the amount of improvement or loss they demonstrated in CATS from 98/99 to 99/00. Those are the most recent scores available. The top half of the list may be thought of as "high improvement schools" and the bottom half as "low improvement schools." Technology-related characteristics of schools in both groups were identified, and they were all characteristics that were in effect during 98/99 and 99/00.

The first factor is "participation in the PET Project." PET Project is an intensive two-day professional development in which a team of teachers from a school collaborates with Technology Resource Teachers on developing a standards-based unit of study that incorporates significant amounts of technology. The focus of the PET Project is on ensuring that the teachers develop an instructionally sound unit and then infuse that unit with what are believed to be effective uses of technology. One requirement of PET Projects this year is that they must place a significant emphasis on literacy and helping to close the achievement gap. The following table shows how schools compared:

Table 6. PET Project Participation

Category of Schools	Number Participating in PET Project
High improvement schools	16
Low improvement schools	7

High improvement schools were more than twice as likely as low improvement schools to participate in the PET Project. That seems to indicate that schools that intentionally concentrate on integrating technology into their instruction are more prone to show improvement in CATS.

The second factor is the presence of at Technology Resource Teacher (TRT). The district employs a cadre of 13 instructional TRTs who are each assigned to several schools. Data on the TRTs indicates that they are doing an outstanding job of providing instructional technology support to teachers. As of April 15, 2001, TRTs had provided 159 workshops for teachers during the 00/01 school year. Their average rating for those workshops was 4.81 on a scale of 1 (worst) to 5 (best). In addition to those workshops, they work directly with teachers in their classrooms during the school day. That approach of professional development that is "on the job, during the course of the school day, in the midst of working with students" was cited by Commissioner Gene Wilhoit as the most valuable form of professional development (Wilhoite, 2001).

In the most recent consolidated plans from schools, 83% of the schools requested TRTs. The district is making a strong effort to provide those services, but some schools have also found ways to fund a full-time TRT position out of their own staffing allocation. The following table shows how those schools compared.

Table 7. TRTs in Schools

Category of Schools	Number of Schools With a Full-Time TRT Whose Main Responsibility Was to Work With Teachers on Instructional Integration of Technology
High improvement schools	5
Low improvement schools	2

High improvement schools were 2½ times more likely to have an instructional TRT than low improvement schools. That seems to indicate that schools with a full-time instructionally oriented TRT are more prone to show improvement in CATS.

A third factor is the amount of technology professional development (PD) teachers received. This was based on the 98/99 school PD plans. It included only school-wide technology PD dealing with instruction. It did not include PD on non-instructional topics like taking attendance or grade books. It also did not include individual PD that teachers receive separately. Teachers get a significant amount of their PD individually, so the numbers in the table below are very low estimates. But they do provide a basis for comparison.

Table 8. School-Wide Instructional Technology PD

Category of Schools	Average Hours of School-Wide Instructional Technology PD
High improvement schools	5.4
Low improvement schools	4.2

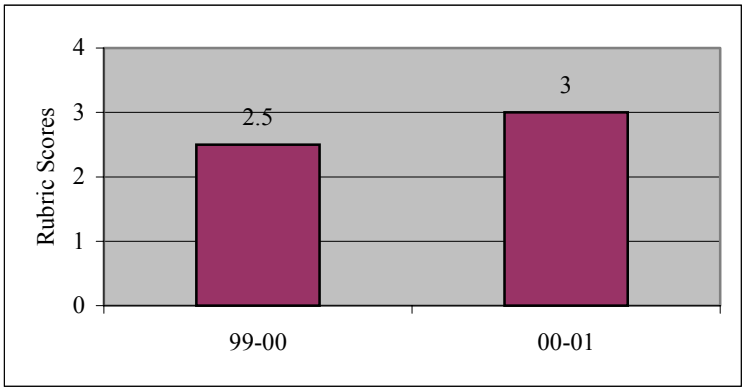
The high improvement schools averaged 5.4 hours of PD versus 4.2 hours for low improvement schools. Even though the high improvement schools had more hours, there does not seem to be a strong relationship. The difference between the two groups was only 1.2 hours. Individual PD may account for more of schools' PD hours.

In summary, it is important to note that this comparison only shows a relationship. It does not show causation. Taken individually, these data on student impact may not be very meaningful. But taken collectively they do seem to demonstrate that (1) effective use of technology goes hand in hand with student achievement, and (2) our schools are making notable improvement in their use of technology.

Teacher Use of Technology

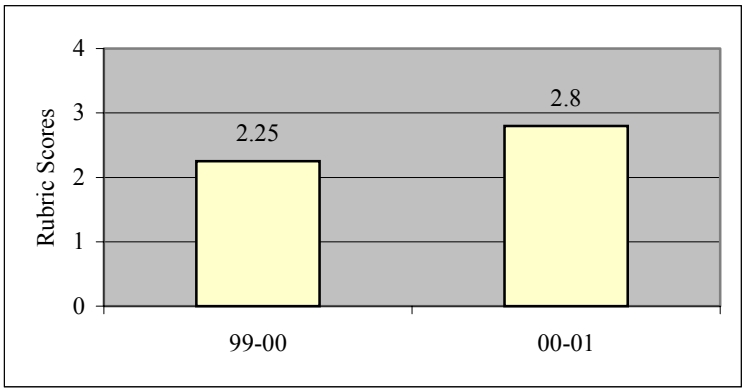
Results in the area of teacher use of technology were nearly all positive. This area was divided into four components. The first component is teacher fluency, which is the degree to which faculty and staff are proficient, knowledgeable, and current with available technology and translate the knowledge into relevant learning opportunities for students. As indicated in the chart below, our teachers improved from 2.5 to 3.0 in fluency. At that level, teachers frequently use online resources, productivity tools, instructional software, and communication tools. They also coordinate with technology specialists to ensure that technology instruction is integrated with core content.

Figure 6. Teacher Fluency



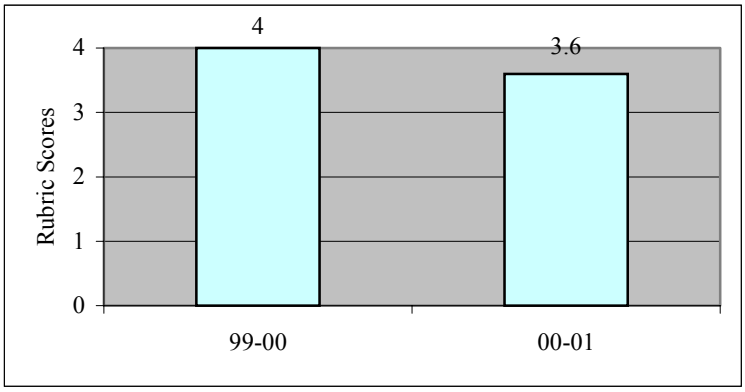
The second component is teacher use with students. Ideally, teachers create learning opportunities and physical environments that allow students to assume more independent roles in their own learning through their use of technology. It is possible for teachers to be highly proficient in their own use of technology, but not use their knowledge in ways that benefit their students. This component is a measure of how well they actually translate their own personal knowledge about technology into instruction. It is also a measure of how much teachers emphasize student-centered instruction. Classroom environment is another factor in this component. Our teachers improved from 2.25 to 2.8 in the area of teacher use with students.

Figure 7. Teacher Use With Students



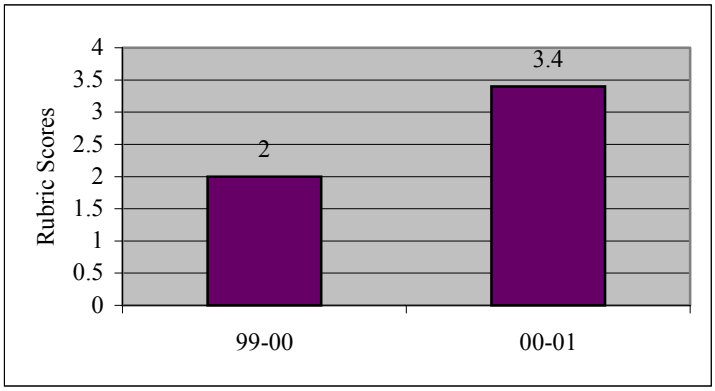
The third component is teacher productivity. This is the degree to which educators use technology to advance their own professional practice and collegial interactions. This component deals less with how teachers use technology with their students, and more with how they use tools like attendance programs, email, etc. for activities that help them professionally. Teacher productivity rated a perfect 4 in 99/00. The rating was slightly lower in 00/01, but still extremely high. This year, our evaluators looked more deeply into evidence of this component and concluded that we were probably over-rated last year. The apparent decline is not an indication of a decline in our teachers. Instead, it is probably just a more accurate and realistic estimate of their actual productivity.

Figure 8. Teacher Productivity



As stated previously, administrator support was a cause for concern in the 99/00 DTA. This fourth component deals with mainly with principals and how they model effective use of technology, develop and support systemic change processes to maximize support for learning, and facilitate appropriate professional development processes. As shown in the figure below, our principals demonstrated very significant improvement this year. Principals have taken the lead by inviting technology staff to give presentations to their councils on effective uses of technology. Technology has been embedded more in training that principals receive. Principals may be paying more attention to teacher use of technology when conducting teacher evaluations. Teachers also indicated that principals have been more involved in technology professional development this year. All of those factors are positive signs for technology. Principals clearly set expectations for their schools and teachers usually follow those expectations. The fact that principals are placing a greater importance on technology is a good sign for future improvements in the use of technology. This should ultimately have a positive impact on student achievement.

Figure 9. Administrator Support



Technology Resource Allocation

Underlying all aspects of technology use in our schools, there must be a strong infrastructure of hardware, software, connectivity, and human support. Those resources must be allocated in such a way as to maximize the efficiency and effectiveness of the functions that technology provides. It's critical to not only provide the materials that schools need, but to also provide the people to support schools in their use of technology.

Fayette County is fully networked. Computers are in every classroom and they are connected to the local and wide area networks, and ultimately to the Internet. Classrooms also have telephones, televisions, and an assortment of other technological resources. Schools are beginning to use technology resources to offer instruction that students would not have access to otherwise. For example, a few schools employ distance learning, via the Kentucky Telelinking Network, the Kentucky Virtual High School, or standard video conferencing modalities. However, our schools are far from reaching the real potential of those resources. It's important to continue promoting those resources within our schools.

Even though our schools have essentially reached the KETS goal of one computer for every six students, access to some of those computers may be limited. One reason is that some of the computers are reaching the point of obsolescence and need to be replaced. Another reason is that a significant number of computers are placed in labs and not enough of them in classrooms. Ideally, students need access to computers in both environments. Computer labs are important for activities in which all students require access to computers at the same time. Classroom computers are vital because they place the resources directly in students' main places of learning and facilitate a more direct link between daily instruction and technology. Despite the importance of both, the scale is still tipped toward computer labs in our district. Schools have begun moving more computers into classrooms, so there has been improvement, but progress still needs to be made.

The Board of Education has taken a positive approach in terms of allocation of human resources. The Board has realized that technology cannot be used effectively if there are not enough highly qualified human resources to support schools. A prime example of this is the addition of Board-funded LAN technicians for each high school. Those positions have made a tremendous difference in the our high schools by ensuring that computers, networks, software, and all the rest of the infrastructure are in good working order. That action had been recommended in the district's two-year consolidated plan.

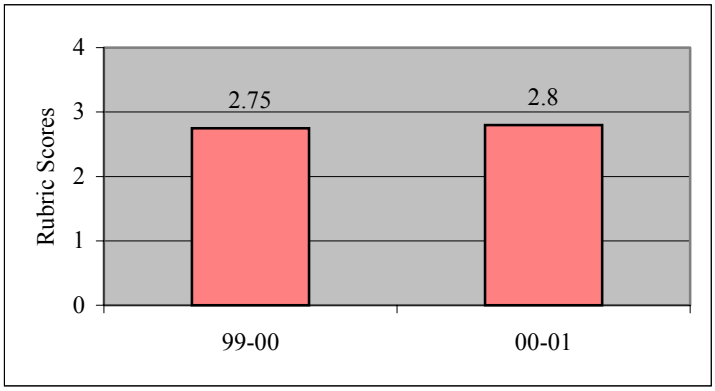
In terms of human resources, the consolidated plan also recommended phasing in LAN technicians in middle schools, thus freeing other existing district-wide technicians to devote all of their time to elementary schools. It is anticipated that the addition of middle school technicians will provide the same positive impact that the high school technicians did. Middle schools are beginning to show a significant amount of strain, as evidenced by some of the data reported elsewhere in this report. For example, the data on physical arrangement of classrooms showed that only 84% of the computers in the observed middle school classrooms were properly connected to the network. That is admittedly based on a small sample of classrooms observed, but connecting computers to the network is a purely technical matter that would normally be handled by a technician. Not having those computers on the network deprived some of our students of valuable instructional resources. As another example, some of our middle schools have experienced significant technical problems with their Read 180 programs this year, causing the program not to work at times. Despite the down time, our students made tremendous progress in reading when using Read 180, but they probably would have made even more progress if the affected schools had had more on-site technical support to ensure the program was working properly.

Another recommendation in the district's consolidated plan is the phasing in of full-time on-site TRTs in all schools with more than 500 students and half-time TRTs in schools with fewer than 500 students. The Board has begun the process of phasing in those positions and the data show them to be effective in promoting student achievement. For example, data in this report indicate that schools that are improving the most on CATS scores are 2½ times more likely to have a full-time TRT who works with classroom teachers on integrating technology into their instruction. It is hoped that the phase-in process will continue. Some schools have responded by creating a full-time TRT position out of their own staffing

allocations. However, that places a significant burden on those schools because it takes away a classroom teacher position. They feel the TRT position is vital enough to their school to justify the loss of a classroom teacher, but they also have expressed a desire for the Board to fund those positions. In fact, 83% of schools' consolidated plans made reference to the need for TRTs.

Results of the Infrastructure allocation part of the DTA are shown in the chart below.

Figure 10. Infrastructure Allocation



Based on all of the above evidence, the district seems to be making progress in infrastructure allocation, but the progress remains slow in comparison with the 99/00 DTA.

Conclusion and Recommendations

We wish to thank Sun Associates for the original assessment upon which this year's assessment was based. They provided a solid baseline for comparison and good framework from which to continue conducting technology assessments each year. They also provided helpful recommendations for future research. Based on those recommendations, the following changes have been incorporated into the 00/01 assessment: additional emphasis on gathering administrative data, and more detailed evaluation of PD, especially the PET Project.

Fayette County Schools have improved in nearly all areas of this assessment. The student achievement data are particularly encouraging. A clearer relationship is beginning to emerge between student performance and the use of effective technology practices. The assessment also provides a clearer vision about activities that should be pursued in order to further advance student achievement. For example, there is evidence that we can make a greater impact on student writing by placing additional emphasis on keyboarding at an early age.

We continue to show improvement in teacher fluency and teacher use with students. The teacher productivity score declined somewhat from last year, but that is more due to a closer analysis of data than to any actual decline in performance. Regardless, teacher productivity remains our strongest area. Administrator support rose dramatically in this year's assessment, allaying fears in the previous assessment that our principals were not adequately supportive of technology.

There are small signs of improvement in the infrastructure. However, enough infrastructure problems still exist to have prevented this rubric score from increasing significantly. Suggestions for improving the infrastructure are included in the recommendations that follow.

Recommendations

These recommendations are based upon specific results from the 00/01 DTA. Some are continuations of recommendations from the original DTA that was conducted by Sun Associates. Those continuations are in areas that would be expected to take several years to accomplish. Some other recommendations are new, based on more current data.

1. Continue increasing the use of classroom computers, while maintaining the functionality of computer labs. Both uses of computers are important, but too many resources have been placed in labs in the past, to the detriment of classroom technology.
2. In PD, continue emphasizing that technology is a tool that supports all instruction, rather than a "skill" in and of itself.
3. The Kentucky Department of Education is expected to release a set of technology standards for administrators in the near future. Once those standards are released, the district should adopt them. That has already been done for teachers and they were added to the teacher performance evaluation system. That may account for some of the improvement the district has seen in teacher use of technology this year.
4. Continue the innovative PD practices that have been added within the past two years. Those include, but are not limited to (a) imbedded PD in which TRTs work directly in classrooms with teachers. (b) PET Project, (c) Online PD, (d) Individualized PD for teachers, and (e) increasing the number and quality of PD offerings in the Ambrose lab.
5. Discontinue the practice of teachers "dropping students off in the computer lab." That was a common practice several years ago when most technology instruction was focused on development of basic skills and teachers were not thought to play an important role in their instruction. Our students have moved way beyond those basic skills and teachers obviously play the most important role in teaching, but a few schools continue not to require teachers to be directly involved. Teachers are the most important ingredient in effective use of technology, so it is essential that they take the lead in all instruction that involves technology, both in and out of computer labs.
6. Continue addressing SBDM councils about their schools' use of technology. Technology staff have already visited about half of the councils and the councils have almost always been receptive to new ideas. This ultimately will make a difference in instructional practices and student achievement.
7. Continue working on improvements to the infrastructure. This may be the single most important recommendation, because it drives everything that schools do with technology. As discussed in the section on "technology resource allocation", schools have consistently requested an increase in TRTs and technicians. Now there is evidence that the investments the district and individual schools have already made in those personnel are improving student achievement.

Appendix 1. Rubrics

Rubrics

Student Achievement Rubric (Question 1)

	Student Achievement
Question	How has technology positively impacted student achievement?
Basic Indicator	Use of technology positively impacts and fosters the student's motivation to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge, communicating results, and acquiring basic skills
Level 4	Technology is used routinely and seamlessly as a tool for learning. Technology positively impacts and fosters the student's motivation to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge, communicating results, and acquiring basic skills. Technology is used to inspire critical thinking and the solving of problems relevant to real-life skills with recognition of the tradeoffs inherent in the application of technology in society. Student work parallels the way in which professionals in the work force use technology. Students exercise a high degree of personal judgment in the choice and application of technology to their learning. Teachers support this choice by designing and facilitating a student-centered learning environment which makes use of a wide variety to technology tools.
Level 4 Evidence	Technology is used in all of the ways documented in the previous levels. In addition, the choice of technology tools used in learning is primarily student directed. Students make appropriate choices with regard to when and where to use technology. For example… • The student exercises personal judgment in the maximum and most appropriate use of technology to assist problem solving, reasoning, and thinking. • Students demonstrate critical thinking and media literacy skills in the use of technology as a research tool.

continued…

Level 3	Students regularly use technology within their learning activities. Fluent use of technology positively impacts and fosters the student's motivation to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge, communicating results, and acquiring basic skills. Use of technology is equally student directed as it is teacher directed. Students exercise **some** degree of personal choice and judgment in their use and application of technology to learning.
Level 3 Evidence	As for Level 2, but considerably more advanced uses of technology are demonstrated. For example... • Students use technology tools to solve problems which require the organization and analysis of data (i.e., a graphing calculator, spreadsheet, database, etc.) • Students use software to create presentations to communicate effectively (i.e. PowerPoint slide shows, etc.) • Students use email to contact experts and communicate with peers about a specific area of interest in order to expand knowledge.
Level 2	Students use **some** technology nearly every day in relation to learning activities. The primary emphasis of technology use is still in the acquisition of basic skills, but there is evidence that the student is beginning to use technology to engage in learning practices that lead to new ways of thinking, understanding, constructing knowledge and communicating results. The vast majority of student technology use is teacher-directed, with students assigned to use particular technology tools, applications, or resources as part of their academic work.
Level 2 Evidence	As with Level 1, except technology use becomes more routine and regular. More advanced uses begin. For example… • Students use a word processor or appropriate software to enhance the organization of products, and to improve quality (i.e., cut-paste, spell check, grammar checking, etc) • Students use technology to solve problems (i.e., a graphing calculator, spreadsheet, database, etc.) • Students use technology to improve problem solving, reasoning, and thinking. • Students use application programs to discover concepts and relationships, especially in science, math, and social studies. • Students use the Internet (download and copy, know useful web sites, and use search engines) and appropriate technologies, such as CD-ROM encyclopedias, as research tools.

Level 1	The student's **initial use** of technology supports the acquisition of basic skills and increased productivity. All uses of technology are teacher-directed. Teachers weave the use of some technology tools and devices into student lessons and activities.
Level 1 Evidence	• Students use calculators, CD ROM-based tutorials, tutorial, and application programs to practice and acquire basic skills and to increase the depth of understanding of particular subject area curriculum. • Students use word processors to write (i.e., cut-paste, spell check, grammar checking, etc) and produce products. • Students demonstrate the knowledge of basic application/productivity software such as spreadsheets, databases, and presentation tools. • Students begin to explore the Internet and become acquainted with email.

Teacher Fluency Rubric (Question 2)

Question	Is the educator fluent with technology and does s/he effectively use technology to the learning advantage of his/her students?			
Basic Indicator	The faculty and staff are proficient, knowledgeable, and current with available technology and translate that knowledge into relevant learning opportunities for students	Teachers create learning opportunities and physical environments that allow students to assume more independent roles in their own learning through their use of technology.	Educators use technology to advance their own professional practice and collegial interactions.	Administrators model the effective use of technology, develop and support systemic change processes to maximize support for learning, and facilitate appropriate professional development processes.
Level 4	Teachers are fluent in the use of, and regularly use a variety of technologies to create knowledge and relevant learning opportunities for students. Teachers serve as models for the effective, productive, and ethical use of technology.	On a daily basis, teachers use and design a variety of learning strategies which incorporate technology. The physical environment of the classroom has been organized by the teacher to be conducive to the use of technology. Teachers actively encourage students, and serve as models for the independent use of technology tools in learning activities.	Teachers use technology on a daily basis for administrative and productivity purposes. Technology is used regularly for professional development and communication both within and outside of the district.	The majority of the communication between district administrators and staff is electronic. Technology use is modeled and effectively and continually supported at the administrative level. Staff are supported in their on-going and systemic efforts at technology staff development.
Level 4 Evidence	• Teachers make virtually daily use of on-line resources, productivity tools (like word processors, spreadsheets, desktop publishers, multimedia tools, presentation software, organizational software), instructional software, and communication tools. • Classroom teachers always use building technology specialists and lab teachers as *resources* and take direct responsibility for insuring that students learn and use technology effectively. • When appropriate, classroom teachers coordinate with technology specialists and lab teachers to insure that student uses of technology are integrated with the core curriculum. • Teachers model effective, productive, and ethical uses of tech.	As below in Level 3 except teacher behaviors are demonstrated on a virtually **daily** basis. Additionally: • Teachers have created the expectation that technology tools and resources will be appropriately used within student learning activities and in the production of student "products." • Students choose and use technology tools under their own volition (direction) with minimal input and direction from their teacher.	As below in Level 3, except teacher behaviors are demonstrated on a virtually **daily** basis. Additionally: • Virtually all teachers have made technology use a routine part of their professional and academic interactions with co-workers, parents, and resources outside of the district. • Technology staff development is on-going and makes use of district teachers who model effective technology uses for their peers.	• 95% of communication is electronic. • Presentation software and devices are used effectively to communicate administrative information to staff and the community. • District administrators support use of technology both fiscally and physically. • Administrators offer recognition to staff for the creative use of technology. • Technology is employed for the professional growth and development of the school and district administrator. • The technology plan for each school is monitored. The building administrator takes responsibility for insuring that the plan is implemented. • A high proportion (virtually all) teaching staff take frequent advantage of technology staff development initiatives. • Administrators recognize and model the ethical use of technology.

Level 3	Teachers frequently use technology to create knowledge and relevant learning opportunities for students. The classroom teacher insures that student uses of technology align with core, non-technology, curriculum objectives by integrating the use of technology tools and resources into many student activities.	Teachers frequently use and design a variety of learning strategies which incorporate technology. These strategies are rather equally split between teacher-directed and student-centered (independent) uses of technology resources. The physical environment of the classroom has been organized by the teacher to be mostly conducive to the use of technology.	Teachers frequently – at least once a week -- use technology for administrative and productivity purposes. Technology is frequently used for professional development and communication. Teachers are generally aware of the technology tools and resources available to them and most make efforts to use these tools.	A large percentage (approximately 75%) of the communication between district administrators and staff is electronic. The administrator is aware of what constitutes effective technology use and often models such use. The building administrator often demonstrates support for building-based technology efforts, including staff development.
Level 3 Evidence	• Teachers frequently use on-line resources, productivity tools (like word processors, spreadsheets, desktop publishers, multimedia tools, presentation software, organizational software), instructional software, and communication tools. • Teachers frequently and regularly coordinate with technology specialists and lab teachers to insure that student uses of technology are integrated with the core curriculum. • Classroom teachers generally use building technology specialists and lab teachers as *resources* and take direct responsibility for insuring that students learn and use technology effectively. • Teachers frequently model effective, productive, and ethical uses of technology.	• Teachers frequently (at least weekly) employ teaching strategies and employ learning activities which incorporate technology tools and resources. • Teachers develop and employ learning strategies which require students to make choices regarding the appropriate use of technology. • The classroom environment is conducive to student accessing technology. • Teachers encourage students to use technology in a variety of individual, small, and whole group settings. • Teachers frequently recognize and model ethical use of technology.	• The majority of teachers use technology to maintain student records (IEP, attendance, classroom database, grades). • Teachers frequently participate in technology professional growth and development. • Teachers frequently communicate using technology (e.g., parent newsletters, invitations, brochures) and use technology as a productivity tool (word processing, spreadsheets, presentations, organizational tools) • Teachers frequently use technology to monitor student achievement. • Teachers frequently use technology to access, process, and communicate research. • Teachers frequently use the Internet for professional purposes. • Most teachers recognize and model ethical use of technology	• 75% of communication is electronic. • Presentation software and devices are often used to communicate administrative information to staff and the community. • District administrators support use of technology both fiscally and physically. • Administrators offer recognition to staff for the creative use of technology. • Technology is frequently employed for the professional growth and development of the school and district administrator. • The technology plan for each school is monitored. The building administrator takes responsibility for insuring that the plan is implemented. • Administrators frequently recognize and model the ethical use of technology.

Level 2	Teachers occasionally use technology to create knowledge and relevant learning opportunities for students. The classroom teacher makes an effort to insure that student uses of technology align with core, non-technology, curriculum objectives.	Teachers occasionally use learning strategies which incorporate technology. The physical environment of the classroom does not appear to be well organized with consideration to the use of technology, nevertheless, there is evidence that students *do* use technology resources within the classroom.	Teachers occasionally use technology for administrative and productivity purposes. Technology is occasionally used for professional development and communication.	Occasionally (50% of the time), communication between district administrators and staff is electronic. The administrator expresses concern that his/her staff understand the principles of effective technology use.
Level 2 Evidence	• Teachers occasionally use on-line resources, productivity tools (like word processors, spreadsheets, desktop publishers, multimedia tools, presentation software, organizational software), instructional software, and communication tools. • Teachers occasionally coordinate with technology specialists and lab teachers to insure that student uses of technology are integrated with the core curriculum. • Teachers model effective, productive, and ethical uses of technology.	• Teachers occasionally (several times a term) employ teaching strategies which incorporate technology. • Teachers occasionally develop learning activities which incorporate appropriate technology tools and resources. • The classroom environment is somewhat conducive to student accessing technology. • Teachers occasionally make decisions on when students should appropriately use technology in individual, small, and whole group settings. • Teachers occasionally recognize and model ethical use of technology.	• Few teachers use technology to maintain student records (IEP, attendance, classroom database, grades). Most of the teachers do not use such tools. • Teachers occasionally participate in technology professional growth and development. • Teachers occasionally communicate using technology (e.g., parent newsletters, invitations, brochures) • Teachers occasionally use technology to monitor student achievement. • Teachers occasionally use technology to access, process, and communicate research. • Teachers occasionally use technology as a productivity tool (word processing, spreadsheets, presentations, organizational tools) • Teachers occasionally use the Internet for professional purposes. • Few teachers recognize and model ethical use of technology	• No more than 50% of communication is electronic. • District administrators often, but without consistency, support use of technology both fiscally and physically. • Technology is occasionally employed for the professional growth and development of the school and district administrator. • The technology plan for each school is monitored. Responsibility for implementation of the plan is unclear. • Administrators occasionally recognize and model the ethical use of technology.

Level 1	Teachers rarely use technology to create knowledge and relevant	Teachers rarely use learning strategies which incorporate	Teachers rarely use technology for administrative and productivity	Rarely if ever is electronic communication employed between district administrators and

	learning opportunities for students.	technology. The physical environment of the classroom does not appear to be organized with consideration to the use of technology.	purposes. Technology is seldom if ever used for professional development and communication. The majority of teachers are unaware of the range of technology tools available to them and the ways that these tools might be used to support teaching and learning.	staff. The administrator is only generally concerned that his/her staff understand the principles of effective technology use. Little effort is expended to insure that staff are implementing technology within their teaching and learning environments.
Level 1 Evidence	• Classroom teachers rely upon technology specialists and lab teachers to formulate and guide student uses of technology. • The classroom teacher makes little or no effort to insure that student technology use relates to core non-technology curriculum objectives. • Teachers rarely use on-line resources, productivity tools (like word processors, spreadsheets, desktop publishers, multimedia tools, presentation software, organizational software), instructional software, and communication tools. • Teachers rarely recognize and model ethical use of technology	• Teachers rarely use teaching strategies which incorporate technology. • Teachers rarely develop learning activities which incorporate technology. • Appropriate technology is rarely used for a given instructional activity. • The classroom environment is not conducive to student accessing technology. • Teachers rarely make decisions on when students should appropriately use technology in individual, small, and whole group settings. • Teachers rarely recognize and model ethical use of technology.	• Teachers rarely use technology to maintain student records (IEP, attendance, classroom database, grades). • Teachers rarely participate in technology professional growth and development • Teachers rarely communicate using technology (e.g., parent newsletters, invitations, brochures) • Teachers rarely use technology to monitor student achievement. • Teachers rarely use technology to access, process, and communicate research. • Teachers rarely use technology as a productivity tool (word processing, spreadsheets, presentations, organizational tools) • Teachers rarely use the Internet for professional purposes. • Teachers rarely recognize and model ethical use of technology	• Little communication between administrator and staff is electronic. • District administrators seldom demonstrate their support of the use technology • Technology is seldom employed for the professional growth and development of the school and district administrator. • Administrators seldom recognize and model the ethical use of technology.

Resource Allocation Rubric (Question 3)

	Allocation of Resources
Question	Has the district allocated technology resources so as to best support all teachers and students?
Basic Indicator	All teachers and learners throughout the district have sufficient access to technology-based productivity tools, on-line services, media-based instructional materials, primary sources of data, and adequate support for using these resources so as to enrich and extend their learning goals.
Level 4	The network infrastructure as planned in the district technology plan is fully in place. This infrastructure reaches every teacher and student in his/her place of work and learning. All teachers and students report having access to a wide selection of productivity tools integrated throughout the curriculum. In all cases, students with special needs have access to assistive and adaptive technology to facilitate their particular learning situation. An adequate phone system is in place so that each classroom has immediate access to parents and administrators.
Level 4 Evidence	• The district's network infrastructure is fully in place and reaches each student and teacher in his/her place of work and learning. • A telephone – with outside access – is installed in every classroom and teacher workspace. • A full-time computer resource teacher is on-site to assist in research, collaborating, designing, and implementing instruction. • Distance learning (video-conferencing) is available to all students and teachers. • Teachers and students (including special needs) have access to a wide variety of productivity software tools and curriculum-specific applications. All software uses have been "mapped" onto the district curriculum and state curriculum frameworks. • All software has been properly licensed and exists as school, district, or state-funded resources.
Level 3	The majority of the network infrastructure as planned in the district technology plan is in place. This infrastructure reaches most (**75%**) teachers and students in their place of work. Those not directly reached have easy access to a shared workstation. A majority of the teachers and students report having access to a wide selection of productivity tools integrated in most areas of the curriculum. In most cases, students with special needs have access to assistive and adaptive technology to facilitate their particular learning situation. A phone system is in place in **most** classrooms so that there is immediate access to parents and administrators.
Level 3 Evidence	• The district's network infrastructure is **mostly** in place and reaches **approximately 75%** of student and teachers in their place of work and learning. • A telephone – with outside access – is installed in approximately 75% of classrooms and teacher workspaces. • A full-time computer resource teacher is on-site to assist in research, collaborating, designing, and implementing instruction. • Distance learning (video-conferencing) is available to most students and teachers. • Teachers and students (including special needs) have access to a wide variety of productivity software tools and curriculum-specific applications. **Most** software uses have been "mapped" onto the district curriculum and state curriculum frameworks. • All software has been properly licensed and exists as school, district, or state-funded resources.

Level 2	Much of (**about 50%**) the network infrastructure as planned in the district technology plan is in place. This infrastructure reaches approximately half of teachers and students in their place of work. Many teachers and students report having access to a wide selection of productivity tools integrated in certain key areas of the curriculum, although there are many areas which do not have technology mappings. Also, a number of teachers report that they are not aware of the availability of appropriate technology resources for their curriculum areas or teaching needs. In many cases, students with special needs have access to assistive and adaptive technology to facilitate their particular learning situation. The classroom-level telephone system is either non-existent or incomplete. Outside phone calls are not permitted from most classrooms.
Level 2 Evidence	• The district's network infrastructure is reaches **approximately 50%** of student and teachers in their place of work and learning. • A computer resource teacher is available to assist in research, collaborating, designing, and implementing instruction, although this teacher is not full-time in each building and has to travel around several schools. • Teachers and students have access to productivity software tools and curriculum-specific applications. **Some** software uses have been "mapped" onto the district curriculum and state curriculum frameworks, but several key curriculum areas/grade levels have not done such mapping and close to half of all teachers report uncertainty as to what technology is most appropriate to their curriculum. • Certain key software applications have been properly purchased and licensed, but a number of teachers still report using "copies" and software purchased with their personal funds.
Level 1	Only about **25%** the network infrastructure as planned in the district technology plan is in place. This infrastructure reaches relatively few teachers and students in their place of work, so most teachers and students must use labs or common areas (e.g., LMC) to access technology. Many teachers and students report having insufficient access to a wide selection of productivity tools integrated in the curriculum. Also, a majority of teachers in particular schools, departments, and/or grade levels report that they are not aware of the availability of appropriate technology resources for their teaching needs. There is no implemented plan to provide students with special needs access to assistive and adaptive technology to facilitate their particular learning situation. Outside phone calls are not permitted from most classrooms.
Level 1 Evidence	• About 25% of the district's network infrastructure is in place according to plan and reaches a relative minority of student and teachers in their place of work and learning. Most students and teachers must access networked workstations in labs or common areas. • The district has hired some computer resource teachers although their distribution is not uniform across the district with some schools and/or grade levels having no specialist assistance. • There is no procedure in place – other than that created by individual teachers for their own use – for mapping technology tools and applications onto the curriculum. • The district intends to purchase licenses for key software applications, but there is little evidence that such uniformity exists.

Appendix 2. Interview Questions

Interview Questions

Principals' Focus Group

Student Access and Use Questions

1. **How do your students typically school-based computers…and why?**

2. **Describe the types of things your students typically do with technology.**

3. **Give me an estimate of the % of your students who have access to a computer at home.**

4. **How about the % of *teachers* who have computers at home?**

5. **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?**

6. **What does technology allow your students to do now – either physically or intellectually – that would have been impossible (or at least more difficult) before technology was widely available in your school?**

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

Teacher Fluency Questions

8. **Can you give me your impressions of how *fluent* your teachers are in their technology use? By "fluent" we mean how skilled are they in both operating the technology AND in applying it to student learning situations.**

9. **What, do you believe is the greatest impact information technology has had on your teachers?**

10. **OK, this question is about YOU. In what ways has YOUR professional practice (as a principal) improved through the use of technology?**

11. **What barriers have you encountered in trying to use technology in your school?**

Leadership/Strategy Questions

12. **Please describe your primary role as "technology leader" in your school.**

13. **What sorts of strategies have you employed to encourage your teachers to use technology?**

14. **What is your definition of "technology integration"?**

15. **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 or your teachers can actually DO this yet…we just want to know what you find interesting.**

Access and Professional Development Questions

16. **What changes would you like to see made in your school with regard to how technology is allocated or structured?**

17. **How often is technology staff development offered to you and your teachers…and who is responsible for conducting this training?**

18. **How often have you *personally* participated in the training that was offered?**

19. **What barriers have you encountered in terms of getting the technology training you want and/or need?**

20. **What has been the most useful use technology workshop you have attended, and why?**

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

Technology Resource Teachers' Focus Group

Student Access and Use Questions

1. **Describe how your students in your schools typically use lab or classroom computers.**

2. **Out of all of the above, what is the most common use of technology in your schools?**

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

3. **In your opinion, what does technology allow students to do now – either physically or intellectually – that would have been impossible (or at least more difficult) before technology was widely available in your school?**

Teacher Fluency Questions

4. **Please describe how teachers in your schools *most frequently* make use of their school computers. We don't want to know all of what they do…just what you see them doing the most often.**

5. **How accessible are the classroom or lab computers to teachers throughout the day?**

6. **In your opinion, what if any impact has the use of information technology had on teachers?**

7. **OK, this question is about YOUR use of technology. What barriers have you encountered in trying to use technology in the classroom and with teachers in your school?**

Vision/Strategy Questions

8. **How do you get your ideas for integrating technology in the classroom?**

9. **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.**

Teacher Access and Professional Development Questions

10. **What percentage of your time is allocated to the following tasks (let me read you the list and the examples first):**

11. **What changes would you like to see made in your school with regard to how technology is allocated or structured?**

12. **How often is technology staff development offered at your school and/or in the district…and who is responsible for conducting this training?**

13. **What barriers have you encountered in terms of getting the technology training you want and/or need?**

14. **What has been the most useful use technology workshop you have attended, and why?**

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

School Technology Coordinators' Focus Group

Student Access and Use Questions

1. **Describe how your students in your schools typically use lab or classroom computers.**

2. **Out of all of the above, what is the most common use of technology in your schools?**

3. **We're interested in your impressions of how the information technology you have just described has impacted student learning. Overall, how have students been impacted by the use of technology in your school?**

4. **In your opinion, what does technology allow students to do now – either physically or intellectually – that would have been impossible (or at least more difficult) before technology was widely available in your school?**

Teacher Fluency Questions

5. **Please describe how teachers in your schools *most frequently* make use of their school computers. We don't want to know all of what they do…just what you see them doing the most often.**

6. **How accessible are the classroom or lab computers to teachers throughout the day?**

7. **In your opinion, what if any impact has the use of information technology had on teachers?**

8. **OK, this question is about YOUR use of technology. What barriers have you encountered in trying to use technology in the classroom and with teachers in your school?**

Vision/Strategy Questions

9. **Tell me what you see as your *ideal* role in supporting the use of technology (by students and teachers) in your school.**

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.**

Teacher Access and Professional Development Questions

11. **What percentage of your time is allocated to the following tasks (let me read you the list and the examples first):**

12. **What changes would you like to see made in your school with regard to how technology is allocated or structured?**

13. **How often is technology staff development offered at your school and/or in the district…and who is responsible for conducting this training?**

14. **What barriers have you encountered in terms of getting the technology training you want and/or need?**

15. **What has been the most useful use technology workshop you have attended, and why?**

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

Elementary Teacher Focus Group

Student Access and Use Questions

1. **Describe how your students typically use lab or classroom computers.**

2. **What kinds of software is available for student use in the classroom or lab?**

3. **How do students typically use the computers…and why?**

4. **Could you give me an estimate of the % of students who have access to a computer at home?**

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

6. **How do you evaluate your students in terms of their technology use?**

7. **What does technology allow your students to do now – either physically or intellectually – that would have been impossible (or at least more difficult) before technology was widely available in your school?**

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

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. **OK, that's what you most frequently do. Now tell us some of the other things…regardless of how often you might do them.**

11. **If not on your desk or in your classroom, where do you use computers most often?**

12. **Do you have access to a computer at home?**

13. **How accessible are the classroom or lab computers to teachers throughout the day?**

14. **What, if any, impact has the use of information technology had on your teaching?**

15. **In what ways has your professional practice (i.e., teaching) improved through the use of technology?**

16. **What barriers have you encountered in trying to use technology in the classroom?**

Teacher Vision/Strategy Questions

17. **How do you get your ideas for integrating technology in the classroom?**

18. **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.**

Teacher Access and Professional Development Questions

19. **What changes would you like to see made in your school with regard to how technology is allocated or structured?**

20. **How often is technology staff development offered at your school and/or in the district…and who is responsible for conducting this training?**

21. **Describe the differences – as you understand them – between the STC, RTC, MRT, and district RTC.**

22. **What barriers have you encountered in terms of getting the technology training you want and/or need?**

23. **What has been the most useful use technology workshop you have attended, and why?**

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

Middle School and High School Teacher Focus Group

Student Access and Use Questions

1. **How do your students typically school-based computers…and why?**

2. **Describe the types of things your students typically do with technology.**

3. **Give me an estimate of the % of your students who have access to a computer at home.**

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?**

5. **What does technology allow your students to do now – either physically or intellectually – that would have been impossible (or at least more difficult) before technology was widely available in your school?**

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

Teacher Fluency Questions

7. **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.**

8. **OK, that's what you most frequently do. Now tell us some of the other things…regardless of how often you might do them.**

9. **If not on your desk or in your classroom, where do you use computers most often?**

10. **Do you have access to a computer at home?**

11. **How accessible are the classroom or lab computers to teachers throughout the day?**

12. **What, if any, impact has the use of information technology had on your teaching?**

13. **In what ways has your professional practice (i.e., teaching) improved through the use of technology?**

14. **What barriers have you encountered in trying to use technology in the classroom?**

Teacher Vision/Strategy Questions

15. **How do you get your ideas for integrating technology in the classroom?**

16. **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.**

Teacher Access and Professional Development Questions

17. **What changes would you like to see made in your school with regard to how technology is allocated or structured?**

18. How often have you participated in the training that was offered?

19. What barriers have you encountered in terms of getting the technology training you want and/or need?

20. **What has been the most useful use technology workshop you have attended, and why?**

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

Appendix 3. Observation Forms

FCPS Classroom Observation Template

School:	
Classroom Number: **Was this teacher suggested by the STC? Y or N**	**Grade/Subject:**
Classroom or Lab?:	**Class Size (est.):**
Observer:	**Date:**

Degree to which teacher is employing direct instruction (Place an X in front of the one you choose):

- Low/None (Students are working independently and/or in student groups)
- Medium (Some teacher direction of the entire class, but half or more of the time as above)
- High (Teacher-directed instruction. Lecture, presentation, etc.)

Brief Description of Classroom Activity/Lesson:
Student Groupings (single, small, large, etc.) and Interactions:
Technology (hardware and software) and/or Instructional Materials In Use:
Number of Computers in this Classroom:
Other Notes:

DTA Observation Form

School:
Room Number:
Suggested by STC?:
Classroom or Lab?:
Observer:
Grade/Subject:
Date:

Student Achievement (Enter a numeral 1 in the appropriate cells.)

- ☐ Students exercise personal judgment in maximum & appropriate use of tech
- ☐ Students demonstrate critical thinking and media literacy in use of tech as research tool
  - ☐ Students use tech tools for data (e.g. spreadsheet, database, graphing calc)
  - ☐ Students use software to create presentations (e.g. PowerPoint)
  - ☐ Students use email to contact experts and communicate with peers
    - ☐ Students use WP or appropriate software to enhance organization & quality of products
    - ☐ Students use tech to solve problems
    - ☐ Students use tech to improve problem solving, reasoning, and thinking
    - ☐ Students use application programs to discover concepts and relationships
    - ☐ Students use Internet and other tech as research tools
      - ☐ Students use tech (e.g. calculators, tutorials) to learn basic skills
      - ☐ Students use word processors to write and produce products
      - ☐ Students demonstrate knowledge of basic application/productivity tools
      - ☐ Students begin to explore Internet and become acquainted with email

0 0 0 0 **Weighted Subtotals**
0 **TOTAL (out of 31 possible)**

Physical Arrangement of Classroom (Not Lab) (Enter a numeral 1 in the appropriate cells.)

- ☐ More than one computer is in classroom.
- ☐ Classroom computers are properly connected and have access to the network.
- ☐ Computers are located where students can use them.
- ☐ Classroom is arranged so that students can work in small groups or individually.
- ☐ There is a projection device in the classroom and it is operational (LCD projector or scan converter).
- ☐ There is evidence of technology-based student work on display in the classroom.

0 **TOTAL (out of 6 possible)**

ACOT Rating Based on This Observation (Choose one cell and enter an X in it.)

☐ Entry	Learn the basics of using the new technology
☐ Adoption	Use new technology to support traditional instruction
☐ Adaptation	Integrate new technology into traditional classroom practice (Here, they often focus on increased student productivity and engagement by using word processors, spreadsheets, and graphics tools.)
☐ Appropriation	Focus on cooperative, project-based, and interdisciplinary work - incorporating the technology as needed and as one of many tools.
☐ Invention	Discover new uses for technology tools, for example, developing spreadsheet macros for teaching algebra or designing projects that combine multiple technologies.

References

References

Allard, S. and White, J. (2000), Comparison of CATS Scores and Library Media Reports. University of Kentucky, August 14, 2000.

Apple Computer Corporation. Changing the Conversation about Teaching, Learning, and Technology – A Report on 10 Years of ACOT Research. 1996. This report can be found online at www.apple.com/education/k12/leadership/acot/library.html.

Russell, M, and Haney, W. (2000), The gap between testing and technology in schools. This resource is online at: http://nbetpp.bc.edu/reports.html

Wilhoit, G. (2001), Why do some schools soar while others struggle? Kentucky Teacher, April 2001.