Case Studies of High-Performing, High-Technology Schools:
Final Case Report on School C

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Case Report on School C

**Education Trust High-Poverty:** Yes  
**Education Trust High-Minority:** Yes  
**Location:** Rural  
**Grades Served:** 6–8

### Methods and Data Sources

The North Central Regional Educational Laboratory (NCREL) study of high-performing, high-technology schools was based on a mixed methodology case study research design (Creswell, 2003; Yin, 2003; Greene, Caracelli, & Graham, 1989; Tashakkori & Teddlie, 1998). The research team elected to use quantitative methods to build on findings from previous studies of what educational technology schools use (Anderson & Ronnkvist, 1999), how schools use educational technology (Becker, Ravitz, & Wong, 1999), and conditions under which educational technology have helped raise student achievement (Mann, Shakeshaft, Becker, & Kottkamp, 1999; Chang, Henriquez, Honey, Light, Moeller, & Ross, 1998; Wenglinsky, 1998). On the other hand, qualitative methods enabled exploration of characteristic uses of educational technology in high-performing schools that may contribute to the academic achievement of low-income, African-American, and Latino students.

Previous studies in both the qualitative and quantitative literature have generally proceeded from a specific use of educational technology to a consideration of its effects on some measure of student achievement, ranging from instruments designed by teachers or researchers to standardized tests. The NCREL study proceeds from success on state achievement tests at the school level to an exploration of educational technology in successful schools. The initial research questions for the case studies were:

- What effects on student achievement do administrators and teachers in high-performing, high-technology schools attribute to educational technology?
- What types of educational technology do administrators, teachers, and students use in high-performing, high-technology schools?
- What educational technology practices do administrators and teachers in high-performing, high-technology schools employ?
- What educational technology policies do administrators and teachers in high-performing, high-technology schools implement?
- How does the technology capacity of high-performing, high-technology schools affect administrator, teacher, and student use of educational technology?
- What resources, strategies, and structures do schools use to become high-performing and high-technology; to what extent are these integrated with other school improvement efforts?

The NCREL research team defined “high-performing” to mean that students’ reading and mathematics performance on statewide achievement tests was in the top third among all schools.
in the state at the same grade level during the 1999–2000 school year. This definition was chosen to be consistent with No Child Left Behind requirements for adequate yearly progress in both subjects. The NCREL definition represents a subset of schools identified by The Education Trust in which students’ reading or mathematics performance was in the top third among all schools in the state at any grade level in 2000 (Jerald, 2001). The research team used Education Trust definitions of “high-poverty” and “high-minority” without modification to identify high-performing schools with predominantly low-income, African-American, or Latino student populations. The research team identified all schools that met the NCREL criteria for high-performing and The Education Trust criteria for high-poverty or high-minority in 10 states were selected on the basis of geographic distribution and size of low-income, African-American, or Latino student populations.

The research team then surveyed principals of qualifying schools to identify those that used educational technology most intensively, regardless of how they used technology (Sweet, Rasher, Abromitis, & Johnson, 2004). Based on the results of the principal survey, the research team defined “high-technology” to mean schools that reported 50 percent or more of all teachers use technology for professional purposes and assign their students to use technology every school day, and 75 percent or more of all teachers use technology for professional purposes and assign their students to use technology at least once per week. Due to the large number of qualifying schools in one of the 10 states, the criteria was set at 90 percent or more of all teachers using and assigning technology every school day in that state. The research team then conducted telephone interviews with the technology coordinators of all schools that met these criteria and eliminated schools in which the technology coordinator did not corroborate the levels of technology use and assignment reported by the principal.

The research team identified 41 schools that met all criteria for high-performing, high-technology schools with predominantly low-income, African-American, or Latino student populations. In order to encourage administrators and principals to be as forthcoming as possible, the research team pledged that the schools would remain anonymous in all research reports. Twenty of the eligible schools accepted an invitation to participate in case studies. After site visits were conducted, the research team decided to combine one middle school and high school for analysis because they were both located in the same building in a small rural district and respondents in these schools indicated extensive interdependence. In addition, some elementary teachers, also located in the same building, were interviewed and observed during the first site visit because respondents indicated extensive interdependence with the middle school. As a result, the NCREL study included 19 cases of high-performing, high-technology schools with predominantly low-income, African-American, or Latino student populations.

A member of the research team visited each school during the winter of 2002. Open-ended interview protocols provided qualitative data, while classroom observation protocols and survey instruments contained a mix of open- and close-ended items that provided both qualitative and quantitative data. Principals were asked to schedule at least six teachers for 30-minute interviews and 20- to 25-minute classroom observations. Technology plans and school improvement plans were collected during the winter site visit whenever they were available and other documents were collected when offered. Surveys were distributed to all administrators and teachers in each school after site visits were completed. Principals were briefed by telephone on data collection
procedures and asked how many printed administrator and teacher surveys should be mailed to
the school. Response rates were calculated based on the number of surveys principals requested,
and at least two subsequent telephone calls were made to each teacher to improve response rates.

A case report was drafted based on the triangulation of interview, observation, survey, and
documentary (Yin, 2003; Greene et al., 1989). The draft case report addressed each of the
original research questions and identified primary and secondary characteristics of each school
based on each question. In general, attributes that were reported by a majority (at least one half)
of respondents in the school were classified as primary and attributes reported by a substantial
minority (at least one fourth) were classified as secondary. Attributes reported in multiple data
sources were assumed to be more reliable than those reported in one data source. The draft case
report was returned to the principal of each school for review and revised based on comments
received from the school.

A member of the research team made a follow-up visit to each school during the spring of 2003.
The primary purpose of the second site visit was to observe classroom uses of technology in
more depth than was possible during the initial site visit. The research team asked principals to
schedule three teachers for a 40- to 45-minute lesson observation, with 30-minute interviews
before and after the lesson. The interview before the observation provided a context for the
lesson and identified curriculum objectives, instructional and assessment strategies, and planned
uses of educational technology. In the interview after the observation, teachers interpreted the
lesson and the extent to which curriculum objectives were met, instructional and assessment
strategies were effective, and uses of educational technology contributed to lesson outcomes. All
lessons that included teacher or student use of educational technology were written up as
classroom vignettes and appended to the case report. Finally, the research team prepared a
summary for each school based on the revised case report, classroom vignettes, and all data that
had been collected from the school.

This report includes the summary, revised case report, and classroom vignettes for one of the 19
high-performing, high-technology schools with predominantly low-income, African-American,
or Latino student populations. This school will be designated as School C in this report, which is
based on the following data collected from the school:

• Six teachers and four administrators were interviewed during the first site visit.
• Seven classrooms were observed during the first site visit.
• Six teachers (55 percent) returned a survey.
• One administrator (50 percent) returned a survey.
• The school returned an infrastructure survey.
• A district technology plan was collected during site visits.
• Three lessons and an after-school program were observed during the second site visit.
Case Background

School C is located in a remote community surrounded by a 600,000-acre state park, approximately 80 miles from a mid-sized city. The location of the community, although beautiful, is remote and isolated. The seasonal population in the area fluctuates from approximately 1,500 in the summer to approximately 5,000 during the peak of winter. The area’s income is from agriculture, tourism, and the seasonal retired and semi-retired residents. Employment is mainly in the hospitality service industries, with some people also employed in agriculture or the state park system.

The local school district is small, serving approximately 450 students on two campuses. The student population served by the district is about two thirds Latino and one third white. The elementary school houses Grades 1–5 and is approximately two miles from the middle and high school campus. The high school, middle school, and administration buildings comprise the main campus. The middle school campus houses Grades 6–8 in four classrooms plus a computer laboratory, and a common room. The high school houses Grades 9–12 and consists of a cluster of five buildings including a gymnasium and multi-purpose room. The middle school and high school were separated about six years ago, and continue to share a principal. Students in Grades 6 and 7 are taught by middle school teachers in all academic subjects, whereas students in Grade 8 are taught by high school teachers in some classes.

Although the student population is predominantly lower income, the extent of support the schools have received from upper income part-time residents of the community is unusual and impressive. The entire middle school and a new high school gymnasium were funded entirely by donations from private individuals amounting to millions of dollars.

School C serves about 100 students in Grades 6–8 on a campus that was completed with state-of-the-art equipment in the spring of 2000. The School C student population is approximately two thirds Latino and one third white. Approximately 10 percent of the students are limited English proficient, and 10 percent of the students are resource program participants. Approximately 70 percent of the students qualify for free or reduced-price lunches. Currently, the school employs four full-time middle school teachers, and the remaining teaching positions are shared with the nearby high school faculty. The average class size at the middle school is 20.

Participants identified three distinct groups of Latino students at School C. The first group, which consists of students whose families have resided in the community for several years, is likely to be bilingual. The second group, which consists of students whose families have more recently migrated from a particular urban area of Mexico, is likely to have received some instruction in English in Mexican schools, and heard English spoken away from school. The third group, which consists of students whose families have migrated from a particular rural area of Mexico, is less likely to have received any instruction in English or heard English spoken away from school. According to respondents, the number of students in the third group has increased dramatically in the most recent two years, creating a major challenge for the school. School goals include the greater integration of technology into all areas, and increased student competency related to standards in reading, writing, math, speaking, and problem solving. The school improvement plan...
reflects these goals with scheduled professional development activities, after-school tutoring and summer school, and the development of a fully functional computer lab.

**Case Summary**

The commitment of faculty and staff to student achievement at School C is apparent in the resources and time they have dedicated to helping students who present challenges (deficiencies in literacy and other basic skills) catch up to their peers. An evolving strategic focus is to provide greater support for the rapidly increasing number of English language learners (ELL) in the school. Last year, the principal hired a full-time ELL teacher for the high school, and plans to hire a second full-time ELL teacher for the middle school next year. Currently, a bilingual teacher’s aide works with ELL students in the middle school on a half-time basis. In addition, the school plans to use a federal Borderlink grant to establish an area in the library with resources specifically for ELL students to learn English and English-speaking students to learn Spanish.

The curriculum at School C has been closely aligned with state standards and teachers feel that this is adequate for test preparation and meeting individual needs of students. Teachers do not feel that they teach to the state test, and report using mostly traditional grouping strategies with students either working independently, in adult-led large group, or adult tutoring sessions. However, the small size of the school allows teachers opportunities to individualize instruction. As one teacher commented, “We are a very small school. So, we are able to keep track of what’s going on with the students and figure out what they need on an individual basis much more easily.”

Most of the students at School C do not have access to computers at home. The district has therefore placed priority on the use of technology. The district technology plan states that in the middle school, technology is central to the curriculum in core content areas. Teachers and students at School C can access computers in their classrooms, a mobile computer lab, and a traditional computer laboratory. Teachers reported using technology as a means to allow students to learn more about the world beyond their isolated community. While technology was reportedly used for exploration and as a motivating tool for students, teachers and administrators view it as one of many tools necessary for learning. Technology is used to enhance instruction and is most frequently used once a week (word processors and Web browsers).

Teachers at School C feel responsible for student learning, and make careful decisions about what occurs in their classrooms. This caring and dedicated community of professionals reported that they adhere to standards and prepare their students through thoughtful discussion and practice in the classroom.

Teachers at School C have found technology a useful tool for enhancing their professional practices. Teachers reported using technology most frequently for communication and the creation of instructional materials. Teachers named using technology to research and create instructional materials and present information to students as having the most significant effect on their teaching practice.
The administrators at School C are described as very supportive of teachers and technology use. Teachers are left to decide for themselves whether they should use technology in their classrooms and do not feel pressured to use technology needlessly. On the survey, the administrator named increasing parental involvement as the highest priorities for school improvement and technology use at School C. As a supporter of technology use, the administrator reported using technology to create administrative materials, to present information to teachers and students, and to keep administrative records as significantly influencing administrative practices.

One of the significant uses of technology at School C is the analysis of test scores in order to identify achievement gaps and set goals for student learning and achievement. Once priorities are set, technology is used to support these goals. Teachers at School C reported that student use of technology for content-specific strategies, research, information analysis, and written expression are some of the uses that contribute to student achievement. Word processors and Web browsers were the software teachers most frequently reported as having the most significant effect on student achievement. In addition, most teachers reported assigning students to use technology to analyze and solve problems, and this was reported to occur at least weekly.

Technology resources are generally viewed as adequate at School C, with only a small number of individuals reporting that it is inadequate. Many at the school feel that grants and district support of technology facilitate the use of technology at the school. The only reported obstacles to technology use are scheduling time to use computers and maintenance issues.

Parents, as well as the local community, are supportive of School C. For example, some of the part-time residents of the community donated millions of dollars for a new middle school and high school gymnasium. Parents are active participants in the education of School C’s students. The administration and teachers regularly survey parents about important issues, and provide school information through conferences, calendars, and weekly and monthly newsletters, using translators as needed to ensure that all families are kept informed. One participant noted that an “extremely high number of parents show up for parent nights.”

School C also provides a number of services for its faculty and students, including family support services, conflict resolution training, and community and classroom health programs. The school administration is highly visible, and parents and community members are welcome to work with students as volunteers or provide input into school programs. To emphasize the skills needed to participate in a multicultural environment, teachers teach conflict resolution and mediation skills, as well as expose students to other places and experiences through two field trips per grade and three assemblies per year. Students also participate in athletic and academic competitions with other area middle schools.
**Academic Achievement**

**Research Question:** What effects on academic achievement do administrators and teachers in School C attribute to educational technology?

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<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tr>
<td>Survey respondents most frequently reported word processing and Web browsing software titles as the top software applications with the most significant impact on student achievement. This software is used largely for researching and writing.</td>
<td>Two fifths of interview respondents reported that teacher care of students was the key school characteristic as a whole that contributes to student achievement.</td>
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<td>One half of survey respondents reported assigning their students to use technology at least weekly to explore concepts, models, or simulations and analyze information or solve problems.</td>
<td>About one fifth of interview respondents reported that the small size of the school, teachers’ strong concern for and dedication to student success, individuation of instruction, and strong community support as strong influences on student performance.</td>
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<td>One half of survey respondents ranked technology use for conducting research or gathering information and analyzing information or problem solving among the top three uses of technology that most significantly impact student achievement.</td>
<td>Two fifths of interview respondents stated that student use of technology for content-specific strategies has had the greatest effect on student achievement. About one third mentioned general technology resources such as word processors, overhead projectors, and VCRs.</td>
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When asked what characteristics of School C as a whole have the greatest effect on student achievement, four (40 percent) of the 10 teachers and administrators who were interviewed cited teacher care and concern for students. Additionally, two (20 percent) participants each cited small school size, teacher competence, individuation of instruction, and the school’s supplementary enrichment program.
During interviews, participants described the people and community at School C as key factors that help explain student performance. The school is quite small in size, which helps to create a strong sense of community among teachers and students alike. Everyone knows everyone else, and teachers care about their students and the progress they make in their classes. Teachers are described as having a genuine concern for and dedication to their students. One teacher described the close relationship she shares with her students: “They all know that I truly care about them as unique individuals that they are … and that my concern is that they achieve their educational best; that they become the best possible human beings they can be.”

Among teachers, there is a strong sense of responsibility and accountability for students’ success in school, and the small size of the school allows teachers to individuate instruction in ways that facilitate student progress. As one teacher observed, “I think the main factor is the social support that we’re able to give the students in the community here. We are a very small school. Therefore, all of the teachers know pretty much all of the students and we interact with them many times a day, sometimes even more. So, we are able to keep track of what’s going on with the students and figure out what they need on an individual basis much more easily.” While teachers and administrators at School C acknowledge that technology has important implications for student learning and achievement, and often helps motivate students to learn and excel particularly in the areas of reading, writing, and editing, the small size of the school and the community it fosters are still regarded as the most significant predictors of student success. As one teacher explains:

“The main point I want to get across to you is that as important as technology is, and it is very important, more than anything what determines our students’ success is the fact that we are a very small school, that the teachers and students have a great deal of contact, and that the community here is so supportive of the school. We have a very high level of poverty. We have a very high level of minority kids. We have a very high level of English second language speakers. But we are still managing to do a very good job with the population. And I think that’s because the administration is so supportive and dedicated, because the teachers are, and because the community is. And we have a good bunch of kids.”

Both parents and members of the local community are strongly involved at School C. The school emphasizes to parents the importance of being involved in their child’s school experience, and parent involvement is thought to be strongly correlated with student performance. Like the school, its local community is largely high-poverty, although there are several wealthy families that have given financially to the school in ways that contributed to its improvement across the board. Teachers reported that, in spite of the high-poverty status of this school and its surrounding community, they feel most students do not realize they are poor or distinguishable in any way from other students in other areas of the country. This may be due, in part, to the remote and isolated location where they reside. However, many students at School C have clear deficiencies, largely in terms of their literacy skills, that teachers and administrators make ardent steps toward addressing. Technology is integrated for this purpose, and is also used to help connect students with the rest of the world that they would otherwise be so isolated from. Though an important learning instrument, students are far from reliant on technology; it is only one tool in an arsenal of many for this school.
When asked what student uses of technology have the greatest effect on student achievement, four (40 percent) of the 10 teachers and administrators who were interviewed stated content specific strategies largely relating to technology and computer use. Three (30 percent) cited general technology resources, including word processors, overhead projectors, and VCRs. Two (20 percent) participants also cited each of the following: student presentations; software; technology used for typing, writing, or editing; and practicing standardized tests. Through the use of a state assessment testing program, students in Grades 2–11 are tested annually in various subject areas. Currently, components of this program that are used at School C include the state standards test, which shows how well students are doing in relation to the state content standards in English language arts and math. The five performance levels are “advanced” (exceeds standards), “proficient” (meets standards), “basic” (approaching standards), “below basic” (below standards), and “far below basic” (well below standards). In 2001, approximately 40 percent of sixth graders, 30 percent of seventh graders, and 30 percent of eighth graders achieved either a “proficient” or “advanced” level in the English language arts on the state assessment test.

Teachers, administrators, and parents at School C take student achievement seriously, although that has not necessarily always been the case. In the 1999–2000 school year, teachers, administrators, and the community supported the district in retaining 17 sixth-grade students in response to a call for greater accountability from the County Office of Education. According to one participant, “That one year had a big impact on this school. We thought everyone in the county would do it, but we were the only district that actually did.” Teachers and administrators use achievement data to further align curriculum to standards and to set academic goals for students and staff. For example, teachers and administrators have identified vocabulary as a targeted skill for greater development and purchased software to support that effort. An after-school program provides additional language arts and mathematics instruction for 20 students at risk of failure. The students are selected by the teachers and administrators based on test scores and report card grades. These students meet with a middle school teacher four days per week for one hour after school. The curriculum is based on the regular school curriculum. An additional after-school program provides supplemental language arts instruction for ELL students.

School C adheres closely to state standards and follows them in every subject area. Teachers generally believe that following the standards alone is adequate for test preparation. Accordingly, teachers do not feel as though they teach to the test: “I’m kind of assuming that our school achievement on the [state] test is based on the quality of their overall education. I don’t really teach to the test … it’s a nice side effect.” The teachers do spend time discussing the test with students to prepare them mentally and emotionally for it. In the past, students did not take the test seriously, as evidenced by behavior such as sleeping during the test. Since making the test an important event, teachers have observed improvement. Also, the testing environment has been modified to a location that is familiar to students with a moderator that they are used to interacting with and know well.

In terms of the software that has most significantly impacted student achievement, teachers returning a technology inventory survey reported a word processor (n=4) and a Web browser (n=4) among the key titles with the most significant impact. No other software title was coded for more than one participant. Teachers also were asked to report what they assign their students to use this software to do. The reported uses were coded by researchers into categories. The most commonly reported purposes were research (n=5), and writing (n=4).
The technology inventory survey also asked teachers to indicate how often they assign their students to use educational technology for each of 16 given purposes. Three teachers (50.0 percent) reported assigning technology to their students for exploring concepts, models, or simulations, and analyze information or solve problems at least weekly. Two teachers (33.3 percent) reported assigning their students to use technology at least weekly to remediate skills not learned, express themselves in writing, graphically organize information or ideas, present information to an audience, and to learn to work independently. Teachers most frequently reported assigning technology use for many of the given purposes, monthly or less. For example, five teachers (83.3 percent) reported assigning technology use monthly or less to create multimedia presentations, create publications such as newspapers, conduct research or gather information, and publish work on the Web. Four teachers reported assigning technology use monthly or less for mastering skills just taught, communication with people outside the classroom, improve computer skills, to learn to work collaboratively and as a free time or reward for good behavior.

The survey then asked teachers to select the three purposes from the list of 16 that have the most significant effect on student achievement, ranking them in order from one to three. Three (50 percent) respondents included conducting research or gathering information among the top three uses, with one (16.7 percent) of these individuals ranking it first, and two (33.3 percent) ranking it second. Three (50.0 percent) teachers also included analyzing information or problem solving within the top three; one (16.7 percent) teacher ranked this item second, while two (33.3 percent) teachers ranked it as the third most significant student use of technology. Two (33.3 percent) teachers reported expressing themselves in writing among the top three uses, both of which ranked this purpose as number one. Two (33.3 percent) teachers also included improving computer skills among the top purposes; one (16.7 percent) indicating it in second place, and one (16.7 percent) indicating it as the third most important student use.
## Technology Use

**Research Question:** What kinds of educational technology do administrators, teachers, and students in School C use?

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<th>Primary Characteristics</th>
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<tr>
<td>Teacher survey respondents most frequently reported use of computers and printers on a daily basis in their classrooms and home offices.</td>
<td>Teacher survey respondents reported use of e-mail software applications.</td>
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<tr>
<td>Teacher survey respondents most frequently reported use of word processing, Web browser, and presentation software applications. Respondents reported using most software on a daily basis in the classroom and at home.</td>
<td>Teacher survey respondents reported assigning use of desktop publishing and social science software applications.</td>
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<tr>
<td>Teacher survey respondents most frequently reported assigning student to use computers and printers. Most hardware is reported used on a daily basis, primarily in the classroom with some use in the computer lab.</td>
<td>Teachers were observed using computers in one fourth of the classroom observations. Teachers also were observed using overhead projectors and other hardware during the site visit. The only software they were observed using was a Web browser application.</td>
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<td>Teacher survey respondents most frequently reported assigning students to use word processing and Web browsing software applications. Respondents mostly reported assigning software on a less-than-monthly basis, with some daily, weekly, and monthly use reported. Software use occurs in the classroom with some use in the computer lab.</td>
<td>Students were observed using computers in less than one half of the classroom observations. Students were observed using computers and printers, and software use included primarily Web browser and presentation applications.</td>
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The administrator who returned a technology inventory survey reported daily use of a computer and printer, and monthly use of a camera, projector, and scanner. All of the aforementioned hardware is reportedly used in the administrator’s office. Software reported by the administrator included daily use of word processing and Web browsing applications, and weekly use of presentation and concept mapping applications.

Seven classroom observations were made at School C. Of these, teachers used computers in two of the seven site visits, and all computer use observed was for a duration of less than five minutes. Two other observations were made of teacher hardware use, and three observations were made of teachers using overhead projectors. Only one observation was made of a teacher using software—specifically Web browser use.

Teachers who returned a technology inventory survey most frequently reported using a computer (n=5) and printer (n=5), followed by an overhead projector (n=2), TV (n=2), and projector—type not specified (n=2). Most hardware is used daily (n=10), with some weekly (n=4) and monthly (n=5) use reported as well. Most hardware is used the classroom (n=16) and teachers’ home...
ofices (n=10). Respondents reported using a variety of software, including word processing (n=7), Web browsing (n=6), presentation (n=3), and e-mail (n=3) applications. Software is primarily used daily (n=14) and weekly (n=8) in the classroom (n=21) and at home (n=10). Teacher interviews revealed that they very frequently use presentation software for content delivery in the classroom primarily because teachers believe this presentational tool is motivating to students and helps them to organize their content more appropriately. Teachers also frequently engage in online professional development and communication opportunities relating to their profession. One teacher stated that technology is a primary means of personal and professional growth that enables him/her to connect with professional learning communities that would not otherwise be accessible given the remote location of School C.

Students used computers in three of the seven observations conducted during the site visit. Each of these three observations was of one student per computer, and each observation lasted for a duration of at least 15 minutes. One other observation was made of a student using both a printer and some other technology (not specifically coded). Students were observed using a limited number of software applications, including three observations of Web browser use, two observations of presentation software use, and one observation each of word art, search engine, and clip art software applications.

Teachers who returned a technology inventory survey most frequently reported assigning students to use a computer (n=6) and a printer (n=5). Teachers reported assigning students to use most hardware on a daily (n=6), monthly (n=4), and less than monthly (n=3) basis; most hardware is used by students in the classroom (n=7), and the computer lab (n=5). Teachers reported assigning students to use 14 different types of software. Teachers most frequently reported assigning students to use word processors (n=5), Web browsers (n=5), and social science (n=3) applications. One teacher reported assigning use of desktop publishing software. Most software is used less than monthly (n=6), with some daily (n=2), weekly (n=4), and monthly (n=2) use reported as well. Most software is used by students in the classroom (n=7) and computer lab (n=5), with some use in the library/media center (n=3) and at home (n=2).

Additionally, interviews with teachers revealed that students use the Internet as a means of allowing them to see the world beyond the small, isolated community of which they are a part. Teachers also assist students in the use of videoconferencing technology for virtual field trips. Also, technology is implemented to assist students in the development and refinement of basic reading and vocabulary skills. One teacher asserted that School C places a strong emphasis on helping students who are performing at the low end of the scale, and technology is viewed as being integral to that process:

“In recent years, we put a lot of emphasis on the very low-end kids; kids who need a lot of work just on basic skills. Because I think we’ve always had a certain percentage of kids who really do well and have always done well in their whole educational career have done well on those tests. But we’ve also had in the past a huge percentage whose language and math skills were just really bad. And we’ve spent a lot of time in the last several years of after school tutoring and we’ve had kind of a remedial math class during the school day one year. There is just a lot of emphasis on getting the kids at the bottom up to the middle or above. I mean we’ve had kids make tremendous improvements.”
Educational Technology Practices

**Research Question:** What *educational technology practices* do administrators and teachers in School C employ?

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<td>Four fifths of the interview respondents reported that communication with staff, parents, or others is the professional use of technology that has significantly affected professional practices. About three fourths reported that finding, creating, and updating instructional resources has affected professional practice.</td>
<td>One third of teacher survey respondents ranked gathering information for lesson planning, accessing information and research on best practices for teaching, keeping administrative records, and communicating with colleagues and other professionals among the top three common ways in which they use technology that influences their teaching practices.</td>
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<td>Teacher survey respondents most frequently reported that word processing, Web browsing, and presentation software applications have had the most significant effect on their teaching practices. This software is commonly used for instruction, generating instructional materials, conducting research, and creating documents.</td>
<td>Two fifths of interview respondents referred to software and finding professional development resources as having had a significant effect on professional practice. One third also mentioned tracking student data.</td>
</tr>
<tr>
<td>All teacher survey respondents reported using technology to keep administrative records and communicate with teaching colleagues and other professionals on a daily or weekly basis. At least one half of respondents reported that they use technology at least weekly to create instructional materials, and gather information for planning lessons or access model lesson plans.</td>
<td></td>
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<tr>
<td>Two thirds of teacher survey respondents ranked the use of technology for the creation of instructional materials among the top three purposes with the greatest effect on their professional practice. One half ranked presenting information to students among their top three.</td>
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</tbody>
</table>

When asked about the professional uses of technology that have the greatest effect on their practice and student achievement, eight (80 percent) of the 10 teachers and administrators who were interviewed mentioned communicating with staff, parents, or others. Finding, creating, or updating instructional resources were mentioned by seven (70 percent) of respondents. Software and finding professional development resources were each mentioned by four (40 percent) participants. Three (27.3 percent) participants cited tracking student data, and two (20 percent) reported the Internet and other administrative or teaching practices.
The administrator who returned a technology inventory survey reported that software for word processing, concept mapping, and creating presentations have had the greatest effect on administrative practices. This administrator largely used word processing software to purchase materials and service, concept mapping applications to create administrative materials, and presentation software to present information to teachers and students. When asked to rank the top three technology uses from a specified list of administrative purposes, the administrator ranked creating administrative materials first, presenting information to teachers or students second, and keeping administrative records third.

The administrator completing a survey indicated the daily use of technology to create administrative materials, keep records, communicate with colleagues, and publicize school information. On a weekly basis, this administrator uses technology to access information and research on best practices, present information, analyze student data, and communicate with parents. Finally, using technology for publishing school information is on a monthly basis. This administrator reports that using technology to create materials, keep records, and analyze student data has had the greatest impact on administrative practice.

Teachers who returned a technology inventory survey most frequently reported a word processor (n=4), Web browser (n=3), and presentation software (n=2) among the three software titles that have had the greatest impact on their teaching practice. Teachers also were asked to report what they use this software to do, and the reported uses were coded into categories. Multiple uses for a given software title were each coded into the appropriate category. The most commonly reported purposes of use were instruction (n=3), instructional materials (n=3), research (n=3), document creation (n=3), and communication (n=2).

The technology inventory survey also asked teachers to indicate how often they use technology for each of 10 specified purposes. On a daily basis, all six (100 percent) teachers reported using technology to keep administrative records and six (100 percent) reported using technology at least weekly to communicate with teaching colleagues or other professionals. Four respondents (66.7 percent) use technology at least weekly to create instructional materials such as handouts and quizzes, and three (50 percent) gather information for planning lessons or access model lesson plans on a daily or weekly basis. Less than monthly, six (100 percent) teachers each reported use of technology for the following purposes: communication with students outside the classroom, publishing class information, and student work on the Web.

The survey then asked teachers to select the three purposes from the list of 10 that have had the most significant effect on their practice, ranking them in order from one to three. Four (66.7 percent) respondents included creating instructional materials in the top three; two (33.3 percent) listed this purpose first, while two (33.3 percent) listed it third. Three (50 percent) indicated presenting information to students among the top three, while two (33.3 percent) teachers listed each of the following also among the top software titles: gathering information for planning lessons, accessing information and research on best practices for teaching, keeping administrative records, and communicating with teaching colleagues.

Seven classes were observed at School C: two sixth-grade, two eighth-grade, and two mixed-grade middle school classes, and one seventh-grade class. Four observations took place in a classroom setting, while three others occurred in the school’s computer lab. Language arts was
the dominant subject area for three of the seven observations, and computers/technology and mathematics were both dominant in two. Additionally, social studies was observed as the dominant subject in one classroom. Three different activity structures were observed: individual work was observed in five classes, adult-led large groups were observed in four classes, and adult tutoring was observed in one class. In four classes, the adult-led large group structure was recorded as the dominant activity structure, and individual work was recorded as the dominant structure in three classes.

**Educational Technology Policies**

**Research Question:** What *educational technology policies* do administrators and teachers in School C implement?

<table>
<thead>
<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tr>
<td>About three fourths of interview respondents cited the provision of technology resources as a key manifestation of state and district policies that benefits students and encourages their high performance.</td>
<td>Two fifths of interview respondents cited administration support of teachers, and plans, policies, and standards as beneficial school and district policies.</td>
</tr>
<tr>
<td>At the state level, one half of administrator interview respondents referred to plans, policies, and standards, and money and grants as affecting School C’s effective use of technology in ways that influence student achievement. At the federal level, all of the administrator survey respondents reported that money and grants have been instrumental to this school’s allocation and use of technology.</td>
<td>In terms of obstacles due to school and district policy, two fifths of respondents indicated that there were not any, at least that they are aware of.</td>
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<td></td>
<td>About one fourth of interview respondents cited inadequate technology support for school staff as a state policy obstacle.</td>
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</table>

The administrator technology inventory survey asked respondents to indicate the priority of 20 given objectives for educational technology for their school on a scale of one to five, with one being the lowest priority and five being the highest priority. The administrator at School C who completed a survey indicated the highest priority for one of the 20 objectives: increasing parental involvement. Nine items were indicated as moderately high: improving teachers’ computer skills, improving teachers’ strategies for integrating technology, individualizing student learning experiences, increasing professional development opportunities for teachers, improving student achievement on state assessments, improving student achievement on standardized tests, better preparing students for careers, making school improvement decisions more data driven, and publicizing student and school accomplishments.

When asked specifically about school and district policies that help School C use technology in ways that contribute to student achievement, seven (70 percent) of the 10 participants interviewed cited technology resources, and one of those participants indicated that these resources are adequate. Four (40 percent) participants indicated both the strong administrative support shown to teachers and plans, policies, and standards, with two (20 percent) teachers reported administration leadership, professional development, and computers. No other response.
was coded for more than one participant. When asked about school or district policies that make it more difficult to use technology in ways that contribute to student achievement, four (40 percent) of the 10 participants stated that there were none, or that they were unsure of such policies. Two (20 percent) respondents cited inadequate time and technology resources as limiting factors to School C’s use of technology. No other response was coded for more than one participant.

School C’s district has made a major investment in technology, and a number of participants see technology as a means of diminishing the geographic isolation of the community. The current Educational Technology Plan (ETP) guides the district’s technology activities for the three-year period from 2002–04. The ETP emphasizes the use of technology to leverage the intellectual capital of faculty and staff to focus on and deliver an enhanced learning experience to the student. The ETP also emphasizes using technology to streamline administrative and management tasks, make them more efficient, and improve communications.

The ETP states that in the middle and high schools, technology has become core to the curriculum in English, social studies, math, and science, and students use computers daily in all of these classes. All high school juniors are required to write a research paper that must include Internet resources, and all seniors must complete a project that includes extensive Internet research, and use some type of technology in a 10-minute presentation to a panel of community members. The ETP provides detailed curriculum goals and objectives for technology at all grade levels, but middle school teachers did not seem to be aware of many of these specifics.

Overall, there seems to be a sense among administrators that the technology environment of the district in general is finally where they want it to be. One participant said, “I think what we’re currently doing will pale in comparison to next year.” The district plans to expand videoconferencing and distance learning through the federal Borderlink grant. One participant noted, “Children will see different teaching styles and curriculum.” In addition, the district will begin Gen Y and Gen T programs next year.

Technology, then, is clearly a priority in the district. The state requires a district technology plan and the district requires a balanced budget. In general, teachers have a lot of autonomy regarding what goes on in the classroom and this is viewed positively. As one teacher stated, “I think the most important policy is, in a way, a hands-off policy trusting the teachers who are in the classroom and in the trenches to see what it is that the students need and to give the teachers the support to get the things that they best need and not insist on some technology being used again just for its own sake or because it’s there. And I think you have to be careful in choosing and we’ve been allowed that freedom of choice. I think that trust is probably the single most important ingredient using technology well.”

In terms of state policies that encourage School C’s use of technology in ways that contribute to student achievement, two (50 percent) of the four administrators interviewed cited both plans, policies, and standards, and money and grants as key benefits. During interviews, teachers and administrators revealed concerns about a state proposition that might adversely affect the school. This proposition concerns English skills proficiency among non-native speakers, and the school is concerned that their performance standards exceed the amount of time they have to get ESL students at the state assessment test performance level that is expected. The fear is that if this
proficiency level is not met, the state may take over the school, which is a standard for low-performing schools.

All four (100 percent) administrators interviewed reported that the money and grants that School C receives as an extension of federal policy is viewed as the primary means through which this school is able to implement and use technology in ways that contribute to student achievement. No specific comments were offered in terms of how state or federal policy may work to hinder School C’s integration and use of technology for educational purposes.

Technology Capacity

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<tr>
<th>Research Question: How does the technology capacity of School C affect administrator, teacher, and student use of educational technology?</th>
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<tbody>
<tr>
<td><strong>Primary Characteristics</strong></td>
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<tr>
<td>The school has forty-three Pentium, iMac, or newer networked computers, all with high-speed Internet connections accessible in major locations on campus. School C owns a total of eight software titles used commonly for word processing, e-mail, Web browsing, reading skills development and assessment, and administrative tasks. One half of teachers and administrators interviewed indicated that the provision of technology support for staff at School C is a defining characteristic of this school that influences student achievement.</td>
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</table>

Because teachers and administrators in this school district understand the role of technology in expanding students’ view of the world, and share in the knowledge that most of their students do not have computer and Internet access at home, the climate within this district is one in which the importance of technology integration is both valued and actualized. A district-level administrator manages the infrastructure, hardware, software, security, and support functions of the district. This individual, who came to the district from a private sector background, has been a central figure in upgrading the district’s technology. The elementary school is approximately two miles from the main campus, and is now connected via two T-1 lines. The buildings of the middle school and high school campuses are connected to the district office via fiber optics. The main campus is connected to the Internet through the County Office of Education (COE), recently replacing a T-1 line with a DS-3 connection in 2003. These improvements have been funded by a mix of district funds, Title I, E-Rate, and state and federal grants. Participants cited the leadership of the district superintendent in securing this funding.

Each classroom in the district has at least one computer with Internet access and each school has at least one computer lab with Internet access. In 2002, hubs were replaced with switches to improve the performance of the local area networks (LANs). In the middle school, student use of
computers takes place almost entirely in the computer lab, which has 24 computers with Internet access, two laser printers, and a scanner. Although this system appears to work fairly well, scheduling glitches and technical support problems were observed by site visitors and mentioned by participants. Each classroom in the middle school has a 36-inch television monitor that is connected to the computer in the classroom.

The school district financial system and student information system are hosted by the COE. District employees who need to access the budget system and student records are able to do so electronically. In September 2002, the district brought a server online to host e-mail and other communications, and collaboration tools for staff. The district now provides an Internet filter locally, having assumed this responsibility from the COE due to problems with desired sites being blocked.

On the technology infrastructure survey, School C reported having an average of 2 computers per administrative office, 2.5 computers per teacher office, one computer in the library, 24 computers in the school computer lab, 5 computers in the mobile computer lab, and 0.5 computers per classroom. All of School C’s 43 computers are newer models capable of running current software. Four computers are allocated to two administrative offices, and four computers are shared across the eight classrooms in the school. Five computers are divided among two staff offices. The library houses one computer, the computer lab has 24 computers in its possession, and the mobile computer lab has five computers. All of the locations on campus are connected to a 100MB Local Area Network and have a T-1 or faster connection. The school reported having three laser printers in the administrative offices, four in staff offices, one in the library, and two in the computer lab. Classrooms are equipped with inkjet printers; four are shared among the eight classrooms on campus. For staff offices, the library, and classrooms, one LCD projector is allocated to each of these locations on campus. Also, there are four monitors shared among the school’s eight classrooms. According to the survey, School C has LAN, e-mail, and printer servers.

On the software inventory section of the survey, School C reported owning a total of eight different software titles: one software suite, one communication tool used for e-mail, two research tools used for Web browsing and reference locating, two educational software titles relating to the development and assessment of students’ reading skills, and two administrative software applications.

When asked about the characteristics of School C’s technology environment that have the greatest effect on student achievement, five (50 percent) of the 10 administrators and teachers overwhelmingly cited technology support for staff. Among this group, only one reported that the provision of technology support administered at School C is inadequate. Three (30 percent) administrators and teachers also each reported software, general technology resources, and communication with staff, parents, and others as key characteristics of School C that strongly influence student achievement. Two (20 percent) participants reported computers, research by students, and the Internet.
### Resources, Strategies, and Structures

**Research Question:** What resources, strategies, and structures does School C use to become a high-technology school, and to what extent are these integrated with other school improvement efforts?

<table>
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<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tbody>
<tr>
<td>Four fifths of teacher interview respondents referred to general technology resources as the specific resources that teachers use to develop their classroom learning environment in ways that encourage student achievement. One half of respondents mentioned classroom management, physical characteristics of the classroom, and content-specific strategies as well. According to one half of administrator interview respondents, strong administrative leadership and support from the district have been instrumental in the development of School C in ways that encourage student achievement. Three fourths of the administrator interview respondents reported that money/grants and the acquisition of software have been key resources in the development of School C’s technology environment.</td>
<td>One third of teachers interviewed mentioned desk arrangement, physical space, high academic expectations, indviduation of instruction, professional development, and other instructional practices as important characteristics contributing to School C’s classroom learning environment.</td>
</tr>
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</table>

When asked about the characteristics of the classroom learning environment and the resources, strategies, and structures they have used to create that environment, five (83.3 percent) of the six teachers who were interviewed indicated general technology resources, including presentation stations and overhead projector. One teacher specified that these resources are adequate. Three (50 percent) teachers cited classroom management, physical characteristics of the classroom, and content-specific strategies. Two (33.3 percent) teachers cited the following resources: desk arrangement, physical space, high academic expectations, individuation of instruction, professional development, and other instructional practices.

Administrators were asked about the resources they use to develop the characteristics of School C in ways that contribute to student achievement and success. Two (50 percent) of the four administrators cited administration leadership and school district support. In terms of the specific resources used by administrators to help develop the school’s technology environment, three (75 percent) of the four administrators cited money and grants, and software applications.
Classroom Vignettes

Three classroom lessons and one after-school program for English language learners (ELL) were observed at School C. The first observation was of a science class of 19 seventh graders. The second was of a mathematics class of 19 sixth graders. The third observation was of an English class of 16 sixth graders and the fourth was of an after-school program of 8 students, mostly sixth graders. Most of the observations took place in the computer lab that is shared among the four classrooms in the school. Teachers or students were observed using computers and other technologies in each of the lessons. In each case, teachers were interviewed before the lesson to establish a context for the lesson observation that follows and an understanding of how instructional strategies and technology will be integrated to facilitate student learning. Teachers also were interviewed following each observation to provide a lesson interpretation and an understanding of the role of technology in achieving specific lesson outcomes.

Seventh Graders in a Science Class

<table>
<thead>
<tr>
<th>Class 1</th>
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</thead>
<tbody>
<tr>
<td>Grade:</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Subject:</td>
<td>Science</td>
<td></td>
</tr>
<tr>
<td>Setting:</td>
<td>Classroom</td>
<td></td>
</tr>
<tr>
<td>Teacher Hardware Used:</td>
<td>Presentation station, overhead projector, computer</td>
<td></td>
</tr>
<tr>
<td>Teacher Software Used:</td>
<td>Web browser</td>
<td></td>
</tr>
<tr>
<td>Student Hardware Used:</td>
<td>Presentation station</td>
<td></td>
</tr>
<tr>
<td>Student Software Used:</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

Before the lesson, the teacher stated that the day’s lesson would be an introduction to genetics and inheritance, and students would learn to identify inherited traits in human beings that are easily observable. The teacher planned to introduce the topic and then have students work in collaborative pairs to compare traits, collect data, and then compare their data with data they will access using the Internet. The teacher also planned to assess student learning through observation, collected data, and a written quiz later in the week.

This observation took place in a classroom where 19 seventh-grade students sat at individual desks. The classroom was equipped with two desktop computers, one printer, audio player, overhead projector, and television. Student work and visual prompts were prominent on the classroom walls; textbooks and other reference materials also were available for student use. During the observation, the teacher introduced a genetics lesson by describing several inheritable traits in humans in a whole-class discussion. This class was the first of the day, and the students were boisterous, but most were engaged in the lesson and several asked questions of the teacher and each other. The teacher handed out a worksheet on which students were instructed to record whether they have each trait. Some students had difficulty determining whether they have certain traits, especially a “widow’s peak,” and the teacher told them whether they had the trait or not. The teacher occasionally redirected a student who was getting off task or becoming disruptive by calling out the student’s name.

When all students had completed the first worksheet, the teacher announced they would be going to a Web site where they would enter the data they had recorded about their traits. The teacher gave directions for going to the Web site, using an overhead projector to demonstrate some
information they would have to enter. The teacher then used a computer, which was projected on a television monitor in the corner of the classroom, to demonstrate how to navigate the Web site, enter, and submit the data. “Then when you and your partner are done, you can find your data to make sure it’s in the database.” The teacher used the presentation station for less than five minutes. At this point, the teacher left the classroom for a moment, returning to announce that there were students from another class in the computer lab so science students would have to enter their data tomorrow; several students expressed their disappointment briefly. Instead, the teacher compiled the trait data for the class by counting hands and writing the results on the overhead projector.

After the lesson, the teacher felt that students learned how to identify certain inherited traits in humans, and although they did not have a chance to compare their data with that of people in other nations, they would finish compiling the class data during a later lesson. Based on feedback the teacher received from students, the teacher estimated that most students understood the concepts, but that the students who have limited English did not. The teacher commented that the school’s computer laboratory does not facilitate group instruction and would prefer to have computers in the classroom, where the students could use them frequently becoming more skilled, and thus eliminating the idea of computers as a distraction. The teacher feels that lack of computer skills is a limiting factor to student learning. The teacher also noted that other factors such as students losing technology privileges or not having parental consent to access the Internet, in addition to a filtering system that restricts access to some educational Web sites like PBS, have limited use of technology.

**Sixth Graders in a Mathematics Class**

<table>
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<tr>
<th>Class 2</th>
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</thead>
<tbody>
<tr>
<td>Grade:</td>
<td>6</td>
</tr>
<tr>
<td>Subject:</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Setting:</td>
<td>Classroom, computer laboratory</td>
</tr>
<tr>
<td>Teacher Hardware Used:</td>
<td>None</td>
</tr>
<tr>
<td>Teacher Software Used:</td>
<td>None</td>
</tr>
<tr>
<td>Student Hardware Used:</td>
<td>Computer, printer, calculator</td>
</tr>
<tr>
<td>Student Software Used:</td>
<td>Web browser</td>
</tr>
</tbody>
</table>

Before the lesson, the teacher stated that students would learn to calculate the circumference and area of a circle. The teacher would give a demonstration and then have students work on problems in collaborative pairs. Students would use calculators to check their calculations and take a quiz on the computer. The teacher planned to assess students’ group work before they would take the computer quiz and would later review their test scores.

This lesson took place in the classroom and the computer laboratory. The classroom was equipped with two desktop computers, and one printer, audio player, overhead projector, and television. Nineteen students sat at individual desks. Student work and visual prompts adorned classroom walls; textbooks, manipulatives, and calculators were available for student use. During the observation, the teacher began a lesson on the circumference and area of a circle by asking some questions from a lectern in the front of the room. The students in this class were very boisterous, but very engaged in the lesson. Several students raised their hands to answer each
question, and the teacher wrote their answers on the whiteboard. The teacher kept students very focused on the lesson and moved quickly, but also joked with students and maintained a personal touch in the whole-group discussion. At the end of the discussion, the teacher placed student into groups (mostly pairs). The teacher then asked a student to hand out graphing calculators, and told students, “Don’t play with the calculators. I want you to listen to me.” This instruction had to be repeated a couple of times. The teacher continued a whole-class discussion, directing students when to use the calculators. When the teacher announced that students would be going to a Web site to enter their answers to some problems, there were audible gasps from several students. The teacher continued to lead the whole class in solving problems at the whiteboard. Then the teacher announced that he had intended to demonstrate the Web page on the television monitor in the classroom, but added, “Guess what didn’t want to work this morning.” Instead, the teacher gave detailed directions about navigating the Web site from a handout. The teacher then directed students to the computer laboratory.

In the computer lab, the teacher reminded students where to type the address for the Web site, warned them not to click on a solutions link, and instructed them not to click on an advertisement. In the computer lab, seven groups of two students each shared one computer with the remaining students working at individual computers. All of the groups found the site quickly and were engaged in the online quiz within a few minutes of entering the lab. There was significant amount of discussion, with students asking the teacher and each other questions about mathematics rather than about computers or the Web site. In most of the groups, one student predominantly used the computer and the other the graphing calculator, although there is occasional sharing in several pairs. As students complete the online quiz, they print the results. The period ends before all groups have finished the quiz, and some who did not finish log off the computer without printing. The teacher appears to have intended to instruct the groups to print their results one at a time. At least one student realized that his group has lost all its work before the teacher tells them.

After the lesson, the teacher stated that based on observations, most of the students appeared to understand the concepts discussed in class. The teacher felt that having students work in groups to peer tutor and present their answers increased their understanding. The teacher also felt that use of the Web site for skills practice enhances learning because students learned whether their answers were correct or incorrect immediately, as opposed to waiting until the end of the test, thus providing “instant gratification.” The teacher noted that while the students had not done many activities in the computer lab, the teacher has accessed a number of Web sites for supplemental information for lessons.

**Sixth Graders in an English Class**

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<th>Class 3</th>
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<tbody>
<tr>
<td>Grade:</td>
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<tr>
<td>Subject:</td>
</tr>
<tr>
<td>Setting:</td>
</tr>
<tr>
<td>Teacher Hardware Used:</td>
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<td>Teacher Software Used:</td>
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<tr>
<td>Student Hardware Used:</td>
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<tr>
<td>Student Software Used:</td>
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</table>
Before the lesson, the teacher stated that students would be working on vocabulary development by learning new vocabulary words. The teacher stated that the district purchased reading skills software, but that there were a lot of problems with the program the first year the school had access. Now that those problems have been fixed, students and teachers are using the program and the teacher planned to use it for the day’s lesson. The teacher planned to assess students by spot-checking their work in the computer laboratory and reviewing a printout on student performance generated by the reading skills software.

This lesson took place in the classroom and computer laboratory. The laboratory was equipped with 25 desktop computers, two printers, and one scanner. During the lesson, 16 sixth-grade students sat at individual computers. During the observation, the teacher began with a Daily Oral Language exercise on the overhead projector. The teacher called two students to the overhead to correct grammatical errors in two sentences. The teacher then picked up a stack of homework and sent students to the computer laboratory in the order in which they turned in their homework. The students who turned in their homework first get their first choice of computers, which seemed to be exciting to them because they could select one of the computers with a new flat panel monitor. About one half of the 16 students in the class logged into the network and started using a reading skills program, quickly and with no glitches. One student was not allowed to use a computer because he had not completed his homework. Some ELL students in the class were working with a tutor in the adjacent common room.

Students used computers for the remainder of the observation (more than 15 minutes). Most students worked at computers individually, but some collaborative pairs also were observed. Once all students were in the laboratory, some students had trouble logging onto the reading skills program. One student suggested that students who were having trouble close out and try again. He indicated that he did this and got in with no problem the second time. All but one of the remaining students were able to begin working in the reading skills program within a few minutes. It was unclear whether that student’s computer privileges had been suspended or he was simply not in the reading skill’s program database. For the first several minutes, there was a significant amount of conversation among students about how to use the program. About halfway through the observation, more of the conversation among students began to concern vocabulary rather than the program itself. Throughout the observation, several students shared their excitement when they completed one level and moved to another. One student exclaimed, “Whoa! Check it out!” Students were engaged and on task throughout the lesson, and several were reluctant to leave the computer lab when the first bell rang.

After the lesson, the teacher stated that after observing student work in the computer laboratory, students appeared to do well and enjoyed using the program. The teacher felt that the individualization of instruction was important to keep students engaged and working at their level. The teacher was unsure whether the vocabulary words covered by the program are on the state achievement test, but noted that even if this was not the case, it is still worthwhile for students to use the program.
**One After-School Program**

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<th>Class 4</th>
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<td>Grade:</td>
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<tr>
<td>Subject:</td>
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<tr>
<td>Setting:</td>
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<tr>
<td>Teacher Hardware Used:</td>
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<tr>
<td>Teacher Software Used:</td>
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<tr>
<td>Student Hardware Used:</td>
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<td>Student Software Used:</td>
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</table>

Before the observation of the after-school program, the teacher stated that students have not been working on the computers for a month and a half, but that they would be using computer programs during the observation. The teacher stated that the overall goal of the program is for students to be able to function in school and with other students using English. The teacher planned to have students access an ELL Web site to practice vocabulary and take quizzes. The teacher would assess students by recording their scores and the time it takes them to complete each quiz.

This observation of the after-school program took place in the computer laboratory. The computer laboratory was equipped with 25 desktop computers, two printers, and one scanner. Eight students from different grades sat at individual computers. During the observation, the ELL teacher’s aide worked with the students. Seven of the students were using a Web site that quizzes English and Spanish vocabulary. The remaining student, who had completed the quizzes on the Web site, was using the reading skills program for the first time. Most of the students were able to log onto the network and get to the Web site quickly and easily. There were three other students who were not part of the after-school ELL program in the computer lab who also were using the reading skills program. As the ELL students completed each exercise, the teacher recorded their percent correct. There was a great deal of conversation in Spanish among the students, and several students asked the teacher questions in Spanish. Some of the students were working quite independently, while others frequently asked questions and received some hints from the teacher.

After the observation, the teacher expressed pleasure in students’ performance during the observation, noting that their test scores increased while they were using the Web site. The teacher stated a preference of one-on-one interaction with students, giving them a chance to work on their pronunciation and verbal skills. However, the teacher added that students have responded well to using computers noting other benefits of computer use, namely an observable improvement in their general computer skills.

Two patterns of technology use were observed at School C: demonstration followed by group work and individualized work. In two of the lessons, teachers introduced the day’s lesson by modeling the activities that students would be expected to complete later in collaborative pairs. In the two other lessons, the teachers gave a brief introduction to the lesson, which comprised mainly of instructions on computer use. Students were assigned to use computers and software to reinforce or assess knowledge of the day’s lesson.
References


