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

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Case Report on School D

Education Trust High-Poverty: Yes
Education Trust High-Minority: Yes
Location: Urban
Grades Served: K–5

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 & Romnkvist, 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...
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 and revised case report 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 D in this report, which is based on the following data collected from the school:

- Six teachers and one administrator were interviewed during the first site visit.
- Six classrooms were observed during the first site visit.
- A technology plan and school improvement plan were collected during the site visits.
- Nine teachers (26 percent) returned a survey.
- One administrator (50 percent) returned a survey.
- Two lessons were observed during the second site visit.
Case Background

School D is a part of the public school system of a major city and is located near the downtown area. This city has experienced an economic downturn, and, as a result, many middle class families have moved from the city to the suburbs. The public school system serves a predominantly minority population of more than 150,000 students, most of which are African-American and less than 10 percent are Latino, white, Asian or Pacific Islander, and Native American. About 70 percent of the students in the district are eligible for free or reduced-price lunches.

School D serves more than 500 students in grades K–5. The student population is predominately African-American, with more than 60 percent of students eligible for free or reduced-price lunches. Teachers report that the student population is changing, with an increase in foster children and children who suffer from emotional problems. School D has a high attendance rate of about 95 percent and almost 95 percent of the school’s teachers have a master's degree or higher.

According to respondents, School D is viewed as a consistent and stable part of its neighborhood community. Some housing redevelopment has occurred around the school, attracting professional families with young children into the neighborhood. Community leaders and businesspeople have been involved with the school as volunteers and mentors; family involvement is encouraged through participation in the parent organization and other committees.

Case Summary

Teachers at School D reported that the school has a family atmosphere, with long-standing staff members who encourage each other and students who continue to grow. Teachers create an atmosphere for achievement by maintaining high expectations for all students.

The school is comprised of self-contained classrooms in the core curriculum subjects with additional classes in science, instrumental music, and vocal music available. School D also houses two self-contained special education classes. Students are taught to appreciate their history and culture through educational and performing arts programs. Computer literacy is taught within the classroom and in the computer lab. Teachers and administrators believe that students have adequate access to computers, although due to scheduling conflicts and the school’s emphasis on test preparation, intermediate students spend more time in the computer laboratory than primary students do.

School D teachers have aligned the curriculum with the state standards so that each grade is a building block to the next. The curriculum includes the use of instructional materials with a strong skills focus such as a reading skills software series, which is a comprehensive language arts program provided by the public school system. Teachers use hands-on manipulatives in math in order to increase conceptual understanding. Students use computers to practice for assessments through an education software program that is exactly matched to the state achievement tests. Many teachers at School D still rely heavily on overhead projectors even
though the school is well-equipped with technology. Students also use the projectors for class presentations.

Professional development is an ongoing process. School D teachers report a strong interest and enjoyment in learning more ways to reach their students. Many of the teachers on staff have been at the school for a number of years and this contributes to the team-like atmosphere among teachers and facilitates collaboration between and across grade levels. One teacher stated, “Most of us have been here; we don’t have a high transient level of teachers moving from school to school. We have a very devoted staff who is also devoted to continuing their training.” Another noted the level of collaboration at the school, “A lot of them meet at grade-level meetings and try to have consistency with all the second-grade teachers being on the same page, all the third-grade teachers being on the same page … By consistency, it helps that when students go to the next grade level, it’s some of the same patterns and some of the same techniques used.”

Teachers at School D also reported using technology for a variety of professional purposes. All of the School D teachers surveyed stated that use of technology for the creation of instructional materials has had the greatest effect on their practice. Other frequent uses of technology include keeping records, accessing information on best practices, presenting information to students, communicating with others, tracking student data, and publishing class information. Although teachers reported that technology has affected their professional practices, many reported using technology on a monthly basis or less.

The administrator at School D is very enthusiastic and supportive of use of technology in the classroom. When asked about their priorities for school improvement and technology at School D, the administrator named improving technology integration, individualizing learning experiences, and making instruction more data driven among the highest priorities. The administrator also uses technology for administrative purposes and named analyzing student data, creating administrative materials, accessing information on best practices, purchasing materials and services, presenting information to students and parents, and communicating with colleagues as uses that have most affected their administrative practices.

The use of technology at School D focuses on practice for standardized tests. Technology is used to analyze student scores and set performance goals for student achievement. This emphasis means that students in the primary grades have less access to the computer laboratory than students in the more intermediate grades and this was reported as an obstacle to technology use. However, most respondents reported that technology resources are adequate at the school and noted that professional development provided by the district contributes to technology use. Teachers reported most frequently assigning students to use technology to master skills and work independently.

School D’s stakeholders consist of students, parents, staff, community leaders or mentors, and businesses. The school has a strong reputation for collaboration within this greater community. Faculty and staff at School D draw on community resources, and they give back. For example, they are very conscious about the home lives of the students, the limitations they face in terms of resources, and exposure to new things. The school provides opportunities for parents to be
involved in learning, such as teaching parents how to use computers. The school also has established mutually beneficial relationships with local businesses and faith-based organizations.

## Academic Achievement

### Research Question: What effects on academic achievement do administrators and teachers at School D attribute to educational technology?

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<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tbody>
<tr>
<td>More than one half of interview respondents mentioned content-specific strategies and the use of hardware other than technology as having the most significant effect on student achievement.</td>
<td>Almost one half of interview respondents referred to teamwork and veteran staff as the school characteristics with the greatest effect on student achievement. One fourth also cited the school’s improvement plan, teacher concern for students, and teacher competence as contributing to student achievement.</td>
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<td>More than one half of survey respondents reported that students use technology monthly or less to analyze information or solve problems, present information, remediate skills, to create publications and multimedia presentations, and to publish work on the Web. Respondents reported assigning technology use monthly or less more often than daily or weekly.</td>
<td>Almost one half of interview respondents indicated that student use of technology to practice standardized tests has implications for student learning at School D. In addition, one fourth of the interview respondents believe that the availability of software and students’ positive attitudes about using technology has a positive effect on achievement.</td>
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<tr>
<td>Survey respondents most frequently reported a Web browser, which is used for research and information gathering, as one of the software titles and purpose for use which have the most significant effect on student achievement.</td>
<td>Almost one half of survey respondents reported that students use software to master skills just taught, or to learn to work independently on a daily or weekly basis. One third assigns students to use technology at least weekly in their free time or as a reward.</td>
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<td></td>
<td>One third of survey respondents ranked mastery and remediation of skills, and learning to work independently among their top three purposes of student technology use that have the greatest effect on achievement. One fourth ranked free time or reward and learning to work collaboratively in their top three.</td>
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</table>

When asked about the characteristics of School D as a whole that have the greatest effect on student achievement, three of the seven administrators and teachers who were interviewed (43 percent) cited staff teamwork and the veteran staff of experienced teachers at the school. Two respondents (29 percent) also cited the school’s improvement plan concerning a unified vision,
teacher concern for students, and competence of the teaching staff. No other response was coded for more than one participant.

Teacher comments frequently attributed students’ high achievement on the state tests to a number of factors unrelated to technology, including a long standing and very devoted teaching faculty, ongoing professional development, the family atmosphere at the school, high expectations for students, and a commitment by the entire staff to school improvement. For example, one teacher commented, “Most of us have been here; we don’t have a high transient level of teachers moving from school to school. We have a very devoted staff who is also devoted to continuing their training.” Another commented that collaboration and consistency between teachers also contributes to achievement, “A lot of them [teachers] meet at grade-level meetings and try to have consistency with all the second-grade teachers being on the same page, all the third-grade teachers being on the same page. I think that by consistency, it helps so that when students go to the next grade level, it’s some of the same patterns and some of the same techniques used.” School administrators use test scores to determine areas of strength and weakness, and to work with teachers to modify instruction or secure materials as needed. The school improvement plan reflects the commitment to increasing student achievement through concrete goals and an action plan for achieving them.

Teachers at School D are aware of the state standards and adhere to them when planning for instruction. Their high expectations for student achievement leads them to utilize proven instructional practices along with a skills-building/drill and practice regime that integrates technology into the students’ learning experiences whenever possible and appropriate.

When asked what student uses of technology have the greatest effect on student achievement, four of the seven participants who were interviewed (57.1 percent) cited content-specific strategies, and hardware other than computers. Three respondents (43 percent) indicated that students’ use of technology to practice standardized tests have had important implications for student learning and achievement at School D. Two teachers (29 percent) also cited software applications and the ability of technology to motivate students to learn. For example, an administrator mentioned a Web-based program that is directly linked to the state standards as one that students like to use because the interaction is solely between the student and the computer, and “they find out that they’re wrong privately.”

Teachers who returned the technology survey were asked to report the three software titles that students use which they believe have the greatest effect student achievement. Teachers most frequently reported a Web browser (n=3), word processor (n=2), and music software (n=2). No other computer programs were reported by more than two teachers. Teachers were then asked to indicate what they assign their students to do with this software. The reported uses were coded into categories. The most commonly reported purpose was research or information gathering (n=3), followed by remediation (n=2), enrichment (n=2), and creating artifacts (n=2).

The technology survey also asked respondents to indicate how often they assign students to use technology for a list of 16 given purposes. Four respondents (44.4 percent) reported they use technology with students on a daily or weekly basis to master skills just taught or to learn to work independently. Three respondents (33.3 percent) use technology weekly as a reward for
good behavior. Two respondents (22.2 percent) have students use technology at least weekly for the following purposes: express themselves in writing; graphically organize information or ideas; explore concepts, models or practice working independently; conduct research or gather information; and improve computer skills. Many of the respondents reported that they assign students to use technology monthly or less for several of the given purposes. For example, six (67 percent) each reported that students use technology monthly or less to analyze information or solve problem, and present information to an audience, and five (56 percent) have students use technology monthly or less for remediation, create publications and multimedia presentations, and publish work on the Web.

Teachers were then asked to rank the top three purposes from the given list that have the most significant effect on student achievement. Three respondents (33.3 percent) ranked mastering skills, remediation of skills, and learning to work independently among their top three purpose of student technology use. Two respondents (22.2 percent) ranked free time or reward, and learning to work independently in their top three. No other purpose was included in the top three as having a significant effect on student achievement by more than one respondent.

Technology Use

<table>
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<tr>
<th>Research Question: What kinds of educational technology do administrators, teachers, and students at School D use?</th>
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<tr>
<td><strong>Primary Characteristics</strong></td>
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<tr>
<td>Survey respondents most frequently reported using computers, printers, word processors, and Web browser.</td>
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<tr>
<td>Survey respondents most frequently reported hardware and software use on a weekly and daily basis in the classroom or home office.</td>
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<tr>
<td>Survey respondents most frequently reported assigning students to use computers, word processors, and Web browser.</td>
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<tr>
<td>Survey respondents most frequently reported assigning hardware and software use in the classroom monthly or less, with some also assigning weekly use.</td>
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<tr>
<td>Little hardware and no computer use by teachers and students was observed during site visits.</td>
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The administrator is enthusiastic about technology for personal use and administrative functions in the school. For example, secretaries do all their ordering online. The principal also values the Internet as a tool for helping to broaden students’ horizons. On the administrator survey, the administrator reports daily use of computers and printers both at school and at home, with only
monthly use of a projector, and no use of technology in either the library or computer lab. The
administrator uses word processing and Web browser software on a daily and weekly basis, but
uses other types of software less than once a month. Software is used in the office at school and
almost as frequently at home.

On the technology inventory survey, teachers reported using computers (n=7), printers (n=6),
and digital cameras (n=4) most frequently. In addition, two teachers reported using an
unspecified projector, and individual teachers reported they use other types of hardware, such as
a keyboard (n=1), fax machine (n=1), stereo (n=1), and scanner (n=1). Most hardware use was
reported to occur daily (n=14) or weekly (n=10). Hardware is also most likely to be used in the
classroom (n=17), or home office (n=11), and no teachers reported using hardware in the
library/media center or computer lab. Teachers most frequently reported using software weekly
(n=10), in the home office (n=10) or classroom (n=6), with some used daily (n=6) or monthly
(n=4). Individual teachers reported using software in the library/media center, and computer lab.
The most frequently used software is a word processor (n=7), followed closely by a Web
browser (n=6). Two respondents reported using presentation or spreadsheet software, and
individual teachers mentioned music, print creativity, math skills, and career software.

Classroom observations of teacher use of technology were generally consistent with survey data.
In the six classroom observations made in the winter site visit, four teachers did not use
technology at all, while one teacher used an overhead projector, and one teacher used an
unspecified type of hardware. No computers were used by any of the teachers who were
observed, and the overhead projector and other hardware were used for less than 5 minutes or for
5–15 minutes only. Although one class had another adult present, that person did not use
technology. Survey and observational data suggests moderate teacher use of computers for word
processing and Web browsing, as well as other hardware, at least weekly in the classroom or
home office. While teachers were not observed using computers during the winter site visits, two
teachers used other hardware.

Teachers who returned a technology inventory survey most frequently reported assigning
students to use a computer (n=7) and a printer (n=4). Other hardware that was mentioned more
than once were an unspecified projector (n=3) and digital camera (n=2). Teachers reported
assigning students to use hardware daily (n=7) or weekly (n=5), or monthly or less (n=6), in the
classroom (n=10) or in the computer lab (n=3). No teachers reported assigning students to use
hardware in the library/media center or at home.

Teachers reported assigning students to use seven types of software. Teachers most frequently
assigned students to use a word processor (n=5), Web browser (n=5), and music (n=2) software.
No other type of software was reported more than once. Most titles are assigned weekly (n=5) or
monthly or less (n=8). Almost all titles are assigned for use in the classroom (n=12), with some
reported used in the computer lab (n=6) or home (n=4).

Classroom observations were generally consistent with survey data. Students in the observed
classrooms did not use computers or any other type of technology. No teachers, adults, or
students used any software during the observations. The survey and observational data suggests
moderate to low student technology use, as survey respondents generally reported assigning

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technology use weekly or monthly, and students were not observed using technology during the winter site visits.

**Educational Technology Practices**

<table>
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<th>Research Question: What educational technology practices do administrators and teachers at School D employ?</th>
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<td><strong>Primary Characteristics</strong></td>
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<tr>
<td>All interview respondents reported that using technology for finding, creating, or updating instructional resources has had the greatest effect on their practice.</td>
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<tr>
<td>Survey respondents most frequently reported word processing software as one of the three software titles with the greatest effect in their teaching practice. Respondents most frequently reported using software for the creation of instructional materials.</td>
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<tr>
<td>More than one half of teachers reported that they use technology on a daily or weekly basis to create instructional materials, gather information, and keep administrative records.</td>
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<tr>
<td>All survey respondents ranked the use of technology for the creation of instructional materials among the top three professional uses of technology with the greatest effect on their practice.</td>
</tr>
<tr>
<td>No computer use by teachers or students was observed during site visits.</td>
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</table>

When asked in interviews about the professional uses of technology that have had the greatest effect on their practice and student achievement, all respondents (100 percent) mentioned finding, creating, or updating instructional resources. Three (43 percent) of the respondents also mentioned use of technology resources in general, communication with staff and parents, and general management and organization as important professional uses. Two (29 percent) respondents stated that using technology with content-specific strategies, presenting visuals
(such as with the overhead projector), and practicing for standardized tests also are frequent uses. No other response was coded for more than one respondent.

The administrator who completed the technology inventory survey reported that word processor, Web browser, and spreadsheet software have had the most significant effect on administrative practice. This software is used for administrative purposes, including creating administrative materials, accessing information, and purchasing services or materials, and analyzing student data. The survey also asked how frequently technology is used for a variety of given administrative purposes. The administrator reported that no specific use of technology occurs on a daily basis; however, each week the administrator uses technology to access information and research on best practices, and to communicate with colleagues at the school and elsewhere. On a monthly basis, the administrator uses technology to create administrative materials, present information, keep administrative records, analyze student data, communicate with parents or guardians, and publicize school information. The administrator uses technology less than once a month to publish school information on the Web. Of the given purposes, the administrator ranked the analysis of student data for school improvement as the number one purpose for technology use, followed by the creation of administrative materials and presenting information to students and teachers.

Teachers who returned a technology survey most frequently listed word processing software (n=5), presentation software (n=3), and a Web browser (n=3) as having the most significant effect on their teaching practice. Two teachers named math skills software and one mentioned music software as also being significant to their practice. Teachers also were asked to report what they use this software to do, and the reported uses were coded into categories. The most commonly reported professional purposes for software use were creation of instructional materials (n=9), followed by instruction (n=2), creating documents (n=2) and data (n=2).

The technology survey also asked teachers to indicate how often they use technology for 10 specified purposes. Five respondents (55.5 percent) each use technology on a daily or weekly basis to create instructional materials, gather information for planning lessons, and to keep administrative records. Other daily or weekly uses of technology included use of technology to access information on best teaching practices, reported by three respondents (33.3 percent), and using technology to present information to students, and communicate with teaching colleagues reported by two respondents (22.2 percent). Individual teachers reported using technology on a daily or weekly basis to communicate with parents, and to publish class information. However, many more School D teachers reported using technology on a monthly basis or less for the given purposes. For example, eight respondents (89 percent) use technology monthly or less to communicate with students, or publish student work on the Web. Seven respondents (78 percent) reported using technology monthly or less to communicate with other professionals or parents/guardians, or to publish class information on the Web.

The survey then asked teachers to select the three purposes from the list of 10 that had the most significant effect on their practice, ranking them in order from one to three. All respondents (100 percent) ranked creating instructional materials in the top three purposes, and five (55.5 percent) ranked it first. Two respondents (22.2 percent) also ranked communication with students’ parents first. Of slightly less importance to teachers was keeping administrative records and accessing
information and research on best teaching practices, which was ranked among the top three purposes by three respondents (33.3 percent); however, neither purpose was ranked first.

Reported professional uses of technology at School D centered on creating and updating instructional materials as well as communication purposes, and these uses are believed to contribute to student achievement. One teacher said, “My use of the Internet, looking at different resources for teachers, comparing them, and seeing what works and what has worked for other teachers and then share on the Internet as well.” Another commented, “I can do my lesson plans on my computer, communications to parents, little newsletters. It’s helped me in a variety of ways to very easily and quickly access information and get it out to the parents or my boss.” Technology is also a welcome tool integrated into teaching practice as one teacher said, “I think using technology helps to clarify a lot of information. For me, technology for professional use has really been to just guide and to help the audience, whomever it may be, adults or children, to better understand what the subject content is really about.”

One kindergarten, two second-grade, two third-grade, and one fourth-grade classroom were observed during the winter site visit. Five of these visits occurred in a classroom setting, and one was in an unspecified setting. Of the observations, five were conducted in language arts classes, and one was in a music class. During the lessons, class activities included an adult-led large group; two thirds included individual work; and one visit included students working in collaborative pairs. No computer use and only minimal technology use was observed.

Educational Technology Policies

| Research Question: What educational technology policies do administrators and teachers at School D implement? |
|---|---|
| **Primary Characteristics** | **Secondary Characteristics** |
| The school district has adopted a reading skills software series. Use is mandated and the reading skills series affects the teachers’ use of technology because they must follow the manual exactly and little technology use is included in the materials. | Almost one half of interview respondents indicated that inadequate technology support hinders their use of technology. However, one third reported that technology support for staff is a benefit of school and district policies. |
| Three fourths of interview respondents indicated that school and district professional development and technology resources are most beneficial. |

One policy that has affected technology use at School D is the adoption by the school district of a reading skills software series. It was clear in the training provided to teachers that they are to follow the teacher’s manual exactly and there is little technology interface provided in the instructional materials. Although some audiotapes and CD-ROMs are available, these are not generally used in the classrooms. School D teachers spend three hours every morning using the reading skills series materials.
The administrator technology survey asked respondents to indicate the priority of 20 given objectives for educational technology at their school on a scale from one to five, with one being the lowest priority and five being the highest. The administrator at School D cited many priorities for student and teacher technology use. Ranked highest in priority were improving teachers’ strategies for integrating technology, using technology to individualize student learning experiences, making classroom instruction more data driven, and increasing professional development opportunities for teachers. Increased student achievement on state assessments and standardized tests, better preparation of students for careers, and the improvement of students’ basic, computer, and 21st century skills also were ranked highest in priority. Finally, the administrator also ranked highest in priority improving administrator computer skills, increasing administrator efficiency, increasing parent involvement at the school, and publicizing student and school accomplishments. Ranked almost as high in priority on the administrative survey are improving teachers’ computer skills, using more technology in curriculum instruction and assessment, using technology to support school reform, and making school improvement decisions more data driven. The administrator is neutral about improving parents’ computer skills, although the school does offer computer classes that parents and a grandparent attend.

Teachers and an administrator were interviewed about the district, state, and federal policies that either contribute to or hinder technology use at School D. The district has implemented a technology phase, and consequently the use of technology is required. Five (71.4 percent) of the respondents cited the professional development opportunities as a beneficial school or district policy, and four (57.1 percent) also mentioned the general technology resources that are made available. Two teachers (29 percent) referred to other unspecified positive characteristics of the district, Internet, and technology support for staff as benefits. The biggest obstacles to technology use are inadequate technology support for staff cited by three respondents (43.0 percent). Class sizes and lack of time also were mentioned as obstacles by individual respondents. Currently, there is not a computer teacher at School D, and the school has never had a qualified part-time or full-time computer or technology support position.

The administrator who was interviewed referred to the state program that provides hardware for teacher use as one of the most beneficial policies, along with a supplementary enrichment program. At the state and federal level, the administrator named the state and federal provision of computers and grant money in support of technology use as benefits to School D. The school does receive Title I and some state money, which is used for the extended day program and for technology. No state or federal obstacles were mentioned.
Technology Capacity

**Research Question:** How does the technology capacity of School D affect administrator, teacher, and student use of educational technology?

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<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<td>Technology use is limited at School D by a lack of technical support and lack of a computer teacher. Past problems with the Internet also have hindered teachers’ reliance on technology.</td>
<td>Almost one half of interview respondents stated that the computer lab and the Internet contribute to the school’s technology environment.</td>
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<td>The computer lab has been rewired for the Internet, and in general, the school is well equipped with a variety of other technology.</td>
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<td>More than two thirds of interview respondents reported that one of the most significant features of School D’s technology is the use of technology to practice standardized tests.</td>
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<td>Two thirds of interview respondents reported that the availability of computers in the classroom contributes to student achievement.</td>
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Each classroom at School D has three or four computers and printers available in each room, as well as audio players and overhead projectors. A television and video player also are mounted in each classroom; there are electronic keyboards in the music class, and a computer lab is available for student and faculty use. In the last few years, the state has had a technology hardware program for teachers and most teachers at School D have taken advantage of this technology offer.

Teachers, the administrator, and students at School D use several types of technology. Generally, fourth- and fifth-grade students use the computer lab during the winter to work on a program that is directly linked to the state standards and the state’s education assessment online practice program. Teachers rely heavily on overhead projectors, which one teacher says allows her to “keep an eye on the students” when presenting information. Students also use the overhead projector for presentations to their classes. In addition, one teacher estimates that 40 percent of students have computer access at home. While School D is well equipped with a variety of technology, much of it is not integrated into the curriculum. A lack of technical support to keep the computers running, lack of a computer teacher, and problems with the Internet has limited teacher use of technology for instructional purposes.

Several other factors have affected technology use as well. Intermediate students use the computer lab for standardized test practice, thus limiting the time primary classes can use the lab. One teacher reported that she has not taken her class to the computer room at all this year. Although several teachers reported that practice with the online test has helped bolster student achievement on the state tests, the lack of personnel to keep the equipment in the school running...
and to support classroom teachers has negatively affected students’ ability to access this resource. In addition, School D last year had a technology teacher who worked with students on the skills they would need for the state achievement test; however, they no longer have this teacher at the school.

During the interviews, teachers and the administrator were asked about the technology environment at School D. Five respondents (71.4 percent) mentioned that the technology use for practicing standardized tests is a significant feature, and four (57.1 percent) cited the availability of computers in the classroom as important. Three respondents (43 percent) stated that the computer lab and the Internet contributes to the technology environment, and individual teachers mentioned teacher presentation software, e-mail, overhead projectors, their listening centers, and the teachers’ laptops as being significant aspects of the school.

School D did not return an infrastructure survey.

Resources, Strategies, and Structures

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<th>Research Question: What resources, strategies, and structures does School D use to become a high-technology school, and to what extent are these integrated with other school improvement efforts?</th>
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<td><strong>Primary Characteristics</strong></td>
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<td>Physical space is a key resource at School D. Two thirds of interview respondents either mention it as inadequate or discuss their manipulation of space through desk arrangements, use of centers, and other strategies as key features of the classroom learning environment. One half of interview respondents also mentioned student-grouping strategies and content-specific strategies. The school enjoys an active and supportive relationship with the parents and community, and draws on this outside support for technology resources, as well as other classroom and school necessities, such as a playground.</td>
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When teachers and administrators were asked about the characteristics of the classroom learning environment at School D and the resources, strategies, and structures that they have used to create that environment, four of respondents (57.1 percent) mentioned physical space. Of these,
two believe the space is inadequate, while the others believe it is adequate or just make general references to space as a resource. Four respondents (57.1 percent) each mentioned student grouping strategies and content specific strategies as being used to develop School D’s learning environment. Three respondents (43 percent) addressed ways teachers organize their space and time for optimum instruction; use of technology, including self-directed learning; use of centers, workshops, or stations, classroom materials or supplies; other instructional practices; and general technology resources (overhead projector, VCR, other hardware). Two respondents (33.3 percent) specifically mentioned computers in the classroom, class size, and two cited hands-on projects and the alignment of curriculum and instruction with standards as important features of the classroom environment.

When the administrator was asked about the resources, strategies, and structures used to develop the school learning environment, staff teamwork, student-grouping strategies, practicing standardized tests, and professional development were all mentioned as contributing factors. When the administrator was asked about what was used to develop the school’s technology environment, again, staff teamwork and professional development were cited.

Of particular importance at School D is the relationship of the school with the parents. Parents are supportive and often donate items to the school. The parents’ group recently raised $4,000 for a new playground. The relationship between the community and the school is reciprocal. The school extends itself by offering computer classes and homework help on the computers, which has inspired some parents to go back to school themselves and earn their GEDs, or to decide to go to college. The principal also mentions partnerships with local businesses, such as a laundry, and with local churches that provide mentors for students. One partnership has resulted in increased use of technology. The school’s relationship with a radio station allows students to get on the radio and express their ideas.
References


