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

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Case Report on School M

Education Trust High-Poverty: Yes
Education Trust High-Minority: Yes
Location: Urban
Grades Served: PK–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.
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 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 M in this report, which is based on the following data collected from the school:

- Seven teachers and one administrator were interviewed during the first site visit.
- Seven classrooms were observed during the first site visit.
- Eight teachers (62 percent) returned a survey.
- One administrator (100 percent) returned a survey.
- The school returned a technology infrastructure inventory.
- Three lessons were observed during the second site visit.

Case Background

School M serves approximately 400 students in Grades PK–5. Students are assigned to School M based on geographic residence, and the attendance rate is above 90 percent. School M is an urban school with a positive, family-like atmosphere.
School M is located in an urban area with high poverty and high unemployment. Employees often earn minimum wage. The community and surrounding area are working at providing job-training opportunities. The community is highly supportive of the school, with parents and other community members actively involved with the educational program by visiting classrooms, participating in classroom activities, and going on field trips. For the past six years, School M has had the largest percentage of parents attend the annual Title I Workshop, and more than 80 percent of the parents participated in the fall parent-teacher conferences. The school has an active Dads Are Doing Something (DADS) for Education Chapter; members volunteer for field trips, assist in the cafeteria, sponsor the Student-of-the-Month program, and have raised money for the Student Activity Fund. As more parents are finding employment, however, the turnout for school activities has decreased.

School M has a community partnership with a local church, which has resulted in additional TV/VCR equipment, and sponsored field trips for students, as well as the opportunity for fifth graders to participate in service activities for the church’s food pantry. The local health department, library, fire department, police department, harbor link, Boys Club, Girls Club, and other community organizations provide support for School M students. Community members also provide additional learning opportunities through the Community Arts Committee and a Reading Buddies program.

**Case Summary**

Teachers at School M have high expectations for students and students are involved in setting their personal achievement goals. In interviews, teachers cited the physical characteristics of their classrooms as contributing to student achievement. Strong classroom management at the schools has led to orderly learning environments for students. Teachers also have positive feelings about technology use in the classroom and intermediate-level teachers credited computer use in the primary grades as contributing to students’ abilities in later grades.

The curriculum at School M has been aligned with the state’s content standards, and the objectives of the state’s education assessment program. In addition, the area schools have established their own standards for each of the elementary grades in core curricular areas. Curriculum and assessments are revised and updated as needed to ensure that all students meet or exceed state standards. Teachers differentiate and vary instruction to meet the needs of students, and technology is integrated into these efforts. Because teachers are focused on aligning their curriculum with state standards, they look for software this is aligned to those standards as well.

School M teachers are actively involved in professional development. They have received training in the Orton-Gillingham Phonics Program, a reading assessment software application, and the use of classroom computers and the computer labs at every grade level. Primary and intermediate-grade teachers have received training and begun using the Everyday Math program; teacher teams are working to develop ways of involving parents in the teaching of math at home.

Teachers at School M were asked about what professional uses of technology have most influenced their practice and the majority of teachers mentioned creating instructional materials, gathering information for lesson plans, or accessing model lesson plans. Teachers also reported
that they use technology most frequently to create instructional materials, keep administrative
records, communicate with parents/guardians, gather information for lesson plans, and access
model lesson plans.

The administrator at School M also was asked about technology use, priorities for its use at the
school, and professional practices. The administrator identified many priorities for student and
teacher use of technology at the school, including improving teachers’ computer skills; using
more technology in the curriculum, instruction, assessment, and testing; and individualizing
learning experiences. Concerning their own professional use, technology has reportedly affected
how the administrator presents information to teachers and students, creates administrative
materials, and communicates with colleagues and parents/guardians. Both the administrator and
teachers reported that a Web browser and word processing software have had the most
significant impact on professional practice.

The school district has invested in a comprehensive computerized student data information
system to help teachers and administrators monitor curriculum usage and student achievement.
Teachers and administrators at School M use technology to analyze achievement data to make
improvements to the curriculum and set achievement goals.

Each class at School M receives 80 minutes of computer time per week in addition to two hours
daily for use of reading assessment software. When surveyed about the student uses of
technology that had the greatest effect on student achievement, half of the teachers reported
remediation of basic skills. Most teachers reported that students frequently use technology to
work independently and collaboratively, and as a free time activity or reward for good behavior.
Teachers also mentioned the reading assessment application as a resource that has been
significant to achievement.

Interview respondents mentioned that a state program that provides teachers hardware, and
district policies and standards as contributing to technology use at the school. Respondents also
had mixed views on the adequacy of grant funds and how these contribute or inhibit technology
use by teachers and students. School M receives schoolwide Title I funds, which support a library
class for every student with the Title I reading/writing teacher. Students choose books to take
home to read; Grades K–2 students write and publish books; while those in Grades 3–5 do
research and write reports. The school sends a Science Olympiad Team to participate in the
competition at a local college in the spring, and with community support, they sponsor a Kids in
Business program, through which the students set up a “mall” in the gym. This program has been
so successful that it has sold out before the end of the school day.

The principal noted that many of the successes at School M are based on a team effort among the
staff. In addition to classroom work, teachers engage students in motivational field trips that are
integrated into the curriculum. Administrator and faculty credit students’ socialization skills to
their academic successes, after-school activities, the family atmosphere at the school, and the
safe environment at the school.
**Academic Achievement**

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

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<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<td>Two thirds of interview respondents cited teacher care and concern for students as a defining characteristic of School M that contributes substantially to student achievement.</td>
<td>One third of interview respondents mentioned staff teamwork and the availability of software as characteristics contributing to student achievement. One fourth mentioned high academic expectations and the computer lab.</td>
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<td>Three fourths of interview respondents cited students’ use of software and general technology resources such as calculators and overhead projectors as having the greatest effect on student achievement.</td>
<td>One fourth of interview respondents cited content-specific strategies and assessing or documenting learning as student uses of technology with the greatest effect on student achievement.</td>
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<td>Survey respondents most frequently listed software titles relating to reading assessment, instruction, and skills development among the top titles with the greatest effect on student achievement, along with math skills software programs.</td>
<td>One third of survey respondents reported assigning students to use technology at least weekly to master skills just taught and analyze information or solve problems.</td>
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<td>Survey respondents most frequently listed literacy as the purpose for student use of software with the greatest effect on student achievement.</td>
<td>One third of survey respondents ranked mastering skills just taught and expressing themselves in writing among the top three purposes of student technology use with the greatest impact on achievement. One fourth ranked conducting research or gathering information among their top three.</td>
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<td>More than two thirds of survey respondents reported assigning students to use technology at least weekly to learn to work independently, collaboratively, in their free time, or as a reward for good behavior. One half assign technology at least weekly to improve computer skills and remediate skills not learned.</td>
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<td>One half of survey respondents ranked remediation of skills not learned as one of the top three student uses of technology that most significantly affects student achievement.</td>
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When asked about the characteristics of School M as a whole that have the greatest effect on student achievement, five of the eight administrators and teachers who were interviewed (62.5 percent) reported teacher care and concern for students. In addition, three participants (37.5 percent) cited staff teamwork and the availability of software for their use. Two respondents (25 percent) stated high academic expectations and the school’s computer lab as factors of the school
environment that promote student success. No other response was coded for more than one participant.

During interviews, many participants described the climate of the school as a team-focused environment where the faculty and administration are highly dedicated to students. Teachers reportedly do whatever it takes to find methods that will promote high performance while meeting the individual needs of students in the learning environment. This school places a strong emphasis on reading, which is believed to be the key to success in other content areas as well. The belief at School M is that students who can read well and enjoy reading will be better able to meet state standards and perform well on state tests. The school has hired reading specialists to assist them with this endeavor, and has an entire lab devoted to reading software. Teachers focus strongly on using technology to motivate students to this end and make learning fun. Students are involved in setting personal goals for achievement and, as a result, have a direct sense of accountability and achievement. One teacher describes how this is accomplished:

“We use the [reading assessment software] program where we test students [with a] standard cloze procedure test to determine their basic reading level. And then, based upon their reading level, they set up goals, how many points that they have to earn through every marking period and it gives them a guideline as to what books they need to read. And, what it amounts to is, in order to reach their goal, they have to read, read, read. And then they come in when they’re prepared and take the quiz … on the computer to test the comprehension of that particular book that they were reading and that has really been a turning point for us over the last, probably, five years since we started it.”

Through this process, students have come to understand the connection between reading and success in their academic endeavors. Students learn to set goals, are encouraged to follow through with those goals and, as a result, feel more confident and assured in school and beyond.

The reading assessment software application and other diagnostic programs are the core influences at this school. Continuous assessments and an emphasis on reading skills are considered important to ensuring student success. As one teacher stated, “[Students] are setting goals. They are reaching them. And then we are, in turn, rewarding them for reaching those goals. We promote success to a large degree here in this building and I have witnessed children just being overly zealous about succeeding. And that reading program, as I said, is probably the strongest emphasis that allows us to have the success that we do.” School M administrators and teachers use assessment data to group students for language arts/reading instruction, where they are taught for mastery of necessary skills and moved to the next level. The success of this strategy, called the Continuous Progress Process, has been evident in the improvement of state assessment scores in reading, math, science, and social studies. As an additional indicator of reading achievement, School M students read more than 19,000 books in 2002, an increase of more than 3,000 from the previous academic year.

Teachers and administrators at School M all clearly focus on meeting standards, and look to software applications that are aligned with those standards as method of assessing students’ skills. The school has worked hard to develop a curriculum that is aligned with state tests and, although they don’t think of themselves as teaching to the test, they are aware of the standards.
and make heavy use of software to help ensure that students are able to meet those standards. One teacher explains that:

“We correlate all of our teaching to state standards. Everything that we’re teaching, if we’re doing our job right, we should be able to tell you exactly which state standard we’re teaching, which district standard we’re teaching. And school policies and district policies, I think, are the same with [the reading assessment software], too, and that’s a biggie. I really think that really takes the students, if they can read, they can do anything.”

When asked specifically about the student uses of technology that have the greatest effect on student achievement, six of the eight teachers and administrators interviewed (75 percent) cited both software and general technology resources, including calculators, and overhead projectors. In addition, two participants (25 percent) cited content-specific strategies and assessing or documenting learning.

Educational software titles designed to assess reading skills were among the top three software titles with the greatest effect on student achievement. Four of the eight teachers also indicated software use for reading instruction and math skills software applications. Three teachers cited reading skills software titles, and two teachers specified software relating to science content and Web browser. Teachers also were asked to report what their students use the aforementioned software applications to do. The reported uses were coded by researchers into categories. The majority of teachers reported that their students use software for literacy (n=10), math skills development (n=4), instruction (n=3), science content (n=2), and researching/gathering information (n=2).

The technology-inventory survey also asked teachers to indicate how often they assign their students to use educational technology for 16 specified purposes. Six respondents (75 percent) reported assigning their students to use technology weekly to learn to work independently. Five respondents (62.5 percent) reported assigning student to use technology at least weekly to learn to work collaboratively, or as free time or reward for good behavior. Four respondents (50 percent) reported assigning their students to use technology at least weekly to improve their computer skills and remediate skills not learned. Three teachers (37.5 percent) reported assigning technology use at least weekly to master skills just taught, and analyze information or solving problems. Survey respondents reported assigning students to technology use on a monthly basis or less more for more than 60 percent of the specified purposes.

Among the list of specified purposes for student technology use, teachers also were asked to indicate the top three uses that have the most significant effect on student achievement. Four teachers (50 percent) cited use of technology to remediate skills not learned, while three teachers (37.5 percent) cited mastering skills just taught, and expressing themselves in writing. Two teachers (25 percent) cited conducting research or gathering information among the top three purposes of technology use contributing to student achievement.
**Technology Use**

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

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<td>All survey respondents reported using computers, printers, and a Web browser. Survey respondents also frequently reported using a word processor.</td>
<td>An administrator at School M reported daily use of a computer and printer. Software use was primarily focused on word processing, presentation development, and Web browsing.</td>
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<td>Survey respondents frequently reported using hardware and software daily or weekly in the classroom, computer lab, and home office.</td>
<td>Survey respondents reported using digital cameras, projectors, tape recorders, spreadsheet, e-mail, presentation, and language arts software applications.</td>
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<td>Survey respondents most frequently reported assigning their students to use computers, printers, reading assessment and instruction software, as well as language arts tools.</td>
<td>Survey respondents reported assigning students to use an overhead projector, cassette player, and digital camera. Students also use Web browser, science content, math and reading skills, math instruction, and reference software applications.</td>
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<td>Survey respondents most frequently assign students to use hardware and software daily or weekly in the classroom or computer lab.</td>
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<td>Classroom observations of student technology use were consistent with survey responses.</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 and projector. Software reported by the administrator included word processing, presentation, and Web browser applications. Hardware was reported used in the office and at home.

Teachers who returned a technology inventory survey most frequently reported using both a computer (n=8) and a printer (n=8). Teachers also reported using a digital camera (n=3), overhead projector (n=3), other projector (n=3), and a tape recorder (n=2). The majority of this hardware is reportedly used in the classroom (n=28), with substantial use also reported in the computer lab (n=11), and in teachers’ home offices (n=15). Teachers most frequently reported using a Web browser (n=8), word processing application (n=7), spreadsheet (n=3), e-mail (n=3), and presentation software (n=2), as well as a language arts tool application (n=2). Teachers reported using most software daily (n=14) and weekly (n=10). Only five titles were used monthly or less. Teachers reported using these software titles in the classroom (n=26), home office (n=20), and the school’s computer lab (n=9).

Of the seven classroom observations made at School M, only one observation was made of a teacher using a computer. Three observations were made of teachers using a television or VCR, and one observation was made of both presentation station and calculator use. In two observations, teachers were not observed using any hardware. A teacher was observed using a computer for 5–15 minutes with reading skills software.
Teachers who completed a technology inventory survey most frequently reported assigning their students to use computers (n=8). Seven teachers reported that their students use printers as well. Two teachers also indicated that they assign their students to use an overhead projector, cassette player, and digital camera. Hardware is most frequently assigned daily (n=9), weekly (n=8), and monthly or less (n=7) for use in the classroom (n=22) or computer lab (n= 9). Teachers completing this inventory reported assigning their students software relating to reading instruction (n=7), reading assessment applications and language arts tools (n=5), and science content and math skills software (n=4). At least three teachers also indicated that their students use a Web browser, reading skills, math instruction, and reference software applications. The most common frequency at which these software applications are used is weekly (n=19) and monthly (n=11). Five titles reportedly are used daily, while one title is used on a less-than-monthly basis. Teachers reported that students use these software titles in the computer lab (n=30), classroom (n=25), and in the library/media center on campus (n=13).

Students used computers in four of the seven observations conducted at School M. Three observations were made of one student per computer, and one observation was made of two students per computer. Students were generally observed using computers for a duration of 5–15 minutes. In addition to observing student computer use, one observation also was made of students using a television or VCR. No other student hardware use was observed. As was the case with teachers, one observation was made of students using reading skills and other educational software. Also, two observations of students using reading assessment software and one observation of other software were made.

Because neither students nor teachers were observed using computers during the second site visit, there are no classroom vignettes for School M.
Educational Technology Practices

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

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<td>Three fourths of interview respondents referred to finding, creating, or updating instructional resources as the professional uses of technology with the greatest effect on practice and student achievement. One half cited communication with staff, parents, and others.</td>
<td>One fourth of interview respondents cited finding professional development resources, aiding career or future school skills, frequent use, integration into instruction, and analyzing test scores as uses of technology significantly affecting their professional practice.</td>
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<td>Survey respondents most frequently reported using a word processor and Web browser for communicating with others outside of the classroom, generating instructional materials, conducting research, and completing various administrative tasks among the three software titles with the greatest effect on their practice and their purpose for use.</td>
<td>The School M administrator reported that use of word processor, Web browser, and presentation software for the purposes of accessing information and communicating with colleagues have had the greatest impact on professional practice. The administrator ranked presenting information to teachers and students, creating administrative materials, and communicating with students, parents, or guardians as the top three purposes of technology use.</td>
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<td>More than four fifths of survey respondents reported using technology daily or weekly to create instructional materials, keep administrative records, and communicate with parents or guardians. Three fourths gather information for planning lessons, or access model lesson plans daily or weekly. Two thirds present information to students at least weekly. One half access information on best practices and communicate with colleagues and other professionals at least weekly.</td>
<td>One third of survey respondents ranked accessing information and research on best practices among their top three uses of technology with the greatest effect on practice.</td>
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<tr>
<td>Three fourths of survey respondents ranked creating instructional materials, and gathering information for planning lessons, or accessing model lesson plans as one of the top three uses of technology with the greatest effect on practice. One half ranked communication with students’ parents or guardians, or with colleagues and other professionals among the top three.</td>
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When asked about the professional uses of technology that have had the greatest effect on their practice and student achievement, six of the teachers and administrators who were interviewed (75 percent) stated finding, creating, or updating instructional resources via the Internet, e-mail,
word processor, and general technology. Four teachers (50 percent) cited communication with staff, parents, or others through use of the word processor, Internet, or e-mail. Two teachers (25 percent) cited the following professional uses: finding professional development resources; technology as an aid for career, life, or future school skills; using technology frequently; integrating technology into instruction; and analyzing test scores.

The administrator who returned a technology inventory survey reported that word processing, Web browsing, and presentation software have had the greatest effect on administrative practice. The administrator at School M uses these applications for accessing information and research, and communicating with colleagues. When asked to rank the top three technology uses from a specified list of administrative purposes, the administrator ranked presenting information to teachers and students, creating administrative materials, and communicating with students, parents, or guardians as first, second, and third, respectively. The administrator at School M uses technology a great deal for communication purposes, such as communicating with the staff via a daily news bulletin and letters home to parents. The administrator also makes presentations to the staff with presentation software and regularly uses e-mail as well. Administrators and teachers use technology to collect and analyze data on student performance as gauged by reading assessment software applications. These data are used to adjust teaching strategies and individuate instruction based on student needs. As one teacher stated, “The structure is one of the reporting and analyzing of the data, and then acting on that data. It doesn’t do any good to have it if you don’t act on it, and that has really been a big one in this school.”

Teachers who completed a technology inventory survey most frequently identified a Web browser (n=8) application among the top three software titles that have had the greatest effect on their teaching practice, followed by word processor (n=7) and a spreadsheet application (n=2). No other software title was coded for more than one participant. Teachers also were asked to report what they use this software to do. Multiple purposes for a software title were each coded into the appropriate category. The most commonly reported purpose was for communication purposes (n=11). Other uses mentioned were use for developing instructional materials (n=8), conducting research (n=4), and administrative student data collecting (n=4); and creating written documents was mentioned once.

The technology inventory survey also asked teachers to indicate how often they use technology for each of 10 specified professional purposes. Seven respondents (87.5 percent) reported using technology on a daily or weekly basis for creating instructional materials, keeping administrative records, and communicate with parents and guardians, and six (75 percent) reported gather information for lesson planning, or access model lesson plans on a daily or weekly basis. Five respondents (62.5 percent) reported using technology at least weekly to present information to students, and half of all respondents (50 percent) reported using technology at least weekly to access information and research on best practices for teaching, and to communicate with teaching colleagues or other professionals. Finally, seven respondents (87.5 percent) reported using technology on a monthly basis or less to communicate with students outside of the classroom and publish class information on the Web.

The survey then asked teachers to rank the top three of the given purposes in terms of the effect on their practices. Six respondents (75 percent) reported creating instructional materials, and
gathering information for planning lessons, or accessing model lesson plans among the top three. Four teachers (50 percent) cited communicating with teaching colleagues and other professionals, and communicating with students’ parents or guardians. Three teachers (37.5 percent) ranked accessing information and research on best practices for teaching as one of their top three purposes for technology use, but none of these ranked it first. No other professional purpose was ranked was ranked in the top three by more than one respondent (12.5 percent).

Overall, teachers’ use of technology at School M is highly focused on using data collected through continuous student assessments, through reading assessment software, to evaluate where student strengths and deficiencies are, and to determine an appropriate instructional strategy based on what these assessments reveal. One teacher described technology as “a valuable tool to help me monitor progress and focus in on areas where I need to re-teach or review or reintroduce.” Teachers also are highly focused on making sure that learning is relevant to students by introducing current events and popular culture that is meaningful to students into classroom instruction. Teachers vary strategies based on students’ needs and what will interest and motivate them to learn. According to the school’s technology/media coordinator, technology and games are one popular strategy that is used:

“It’s a video-controlled society for a lot of our children. Everything has to be a video game or something that is flashy and Stuff. So a lot of times, we reinforce things that we’ve taught through the software or in the classroom with videos that match up to the standards that are written in the district curriculum. So that gives them another way to look at things, another way to learn things. And it also goes to the type of presentation that a lot of our children are accustomed to having. That is part of their generation.”

The seven observations conducted at School M took place in Grade K–5 classrooms; one observation was made in kindergarten, first grade, and third grade, while two observations were made in both fourth- and fifth-grade classrooms. Six of the seven observations occurred in a classroom setting, while one was in a computer lab. In four of the seven observations, social studies was the dominant subject, while science and language arts were each dominant in two observations. Six activity structures were observed in the classes observed at School M. The adult-led large group and individual structures were each observed in four classes, collaborative small groups were observed twice, collaborative pairs, adult tutoring, and peer tutoring were each observed once. Of these structures, both the individual and adult-led large group structures were dominant in three classes, while the collaborative small group structure was dominant in one class.
Educational Technology Policies

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

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<td>The administrator interview respondent reported that there are not any state or federal policies benefiting or hindering the use of technology at School M, at least the administrator does not know of any. The district’s computerized student data management system, which helps teachers and principals monitor curriculum usage and student achievement, is generally viewed as favorable by staff.</td>
<td>One fourth of survey respondents each referred to plans, policies, and standards, professional development, computer lab, computers in the classroom, computers in general, and the alignment of curriculum and instruction with standards as beneficial school or district policies contributing to student achievement. One third of survey respondents cited insufficient district funding and time hinder use of technology in ways that contribute to student achievement. One fourth cited that the school’s acquisition and maintenance of technology was insufficient.</td>
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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 M who completed a survey indicated the highest priority for 10 of the 20 objectives: improving teachers’ computer skills, using more technology in curriculum and instruction, using more technology in assessment and testing, individualizing student learning experiences, improving student achievement on state assessments, improving student achievement on standardized tests, improving students’ computer skills, improving students’ basic skills, improving students 21st century skills, and making school improvement decisions more data driven. None of 20 given objectives were listed as low priority to this administrator, but three items were given a “neutral” rating: improving administrative efficiency, improving parents’ computer skills, and publicizing student and school accomplishments.

The district has developed and is using a comprehensive computerized student data management system to help teachers and principals monitor curriculum usage and student achievement. Scores go into the assessment system, which saves the information and makes it available for later use. Teachers and students use software in all courses except social studies. The school district’s annual education report includes a section on technology that states that the district views the power of technology in how it meets the needs of the learners in the district. To that end, technology has become an integral part of the curriculum and of everyday instruction in each school. The school district is making an effort to bridge the “digital divide” for its students, and the Technology Department has provided comprehensive professional development for teachers to improve their skills in teaching with technology. In addition, the report states that the district is working toward full integration of the core curriculum, along with the inclusion of the fine arts and technology standards, into everyday classroom instruction.
Other initiatives have had an impact on technology use at School M. Last year, a state technology program gave free technology hardware to teachers, which has allowed teachers to feel more comfortable with computer technology. The school recently received computer upgrades, making it possible to upgrade their software. A sizable collection of educational videos, mostly science, is available for classes to view in their rooms. School M owns a video camera, and it is in the process of purchasing a digital camera. All classrooms in the district are wired for local- and wide-area computer use, as well as Internet access.

When asked about school or district policies that help School M use technology in ways that contribute to student achievement, two of the seven respondents (25 percent) indicated each of the following: plans, policies, and standards, professional development, computer lab, computers in the classroom, computers in general, and the alignment of curriculum and instruction with standards. 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, three of the seven participants (37.5 percent) cited insufficient district funding and time. Additionally, two participants (25 percent) cited that the school’s acquisition and maintenance of technology was insufficient. In terms of benefits and obstacles to School M’s use of technology as influenced by state and federal policy, the administrator who was interviewed reported that there are not any, at least none the administrator was aware of.

Technology Capacity

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

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<td>School M owns 47 newer model computers, all of which have a T1 or faster Internet connection.</td>
<td>One third of interview respondents reported that assessment and documentation of learning were key characteristics of School M’s technology environment that help facilitate the use of technology in ways that contribute to student achievement. One fourth cited use of technology in primary grades, computers in the classroom, tracking student data, technology as an aid in developing skills, and other instructional resources.</td>
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<td>Software is readily available for teacher and student use. School M owns 33 software titles that include a variety of productivity and research tools, educational software, and administrative software applications.</td>
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<td>Two thirds of interview respondents named available software as a characteristic of the schools’ technology environment with the greatest effect on student achievement. One half referred to general technology resources and integrating technology into instruction.</td>
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The principal and faculty at School M believe that technology is a supplement to instruction, stating that the frequent use of available technology has had a positive effect on student learning. The school has two networked computer labs, with 15 desktop computers in each. Each class receives 80 minutes of computer time a week, in addition to two hours daily for the reading
assessment software program. Students begin using reading assessment software in second grade, but it also is used for exceptional readers in first grade. Administrators and teachers credit the reading assessment software program with motivating students to seek knowledge. The technology/media specialist is also the reading teacher at the school.

On the technology inventory survey, School M reported having two computers in the administrative office, 30 computers in the lab, and 15 computers distributed across the school’s 17 classrooms. All of the school’s 47 computers are newer model computers capable of running current software applications. School M reported that all of its computers are connected to a 100MB local area network (LAN), and have a T1 or faster Internet connection. Every computer on campus has a monitor. There are two inkjet printers in the administrative office, and five inkjet printers distributed among the school’s 17 classrooms. The computer lab also houses two laser jet printers. The school reported having LAN, e-mail, printer, and Web servers.

On the software inventory section of the survey, School M reported owning a total of 33 different software titles, four productivity tools, six research tools, 18 educational software titles, and five administrative software applications. The productivity tools include word processing, presentation, spreadsheet, database, and software suite applications. The research tools owned by School M include one Web browser and five reference software titles. Education software titles included two titles for reading skills and reading assessment, four titles for reading instruction and math skills, and one title for math instruction, language arts, science, social science, keyboarding, and multimedia. In terms of administrative software, School M reported one student information systems software title.

One teacher characterized School M’s technology environment as one in which technology is consistently integrated across the curriculum in ways that aid teachers in instruction and in assessing student performance. This teacher states, “Okay, with the school’s technology environment, we work very hard from an early level to expose our students to technology and use of technology. And we use that technology that’s available to us to enhance what we’re teaching in our curriculum. We use that to monitor progress, to support what’s introduced in the classroom, and to keep them current in the use of learning tools that are out there in the environment today. The administrators use the materials to monitor and support, pass that knowledge down to the teachers, and the teachers pass the knowledge down to the students making the material user friendly and accessible.”

When asked about the characteristics of School M’s technology environment that facilitate the use of technology in ways that contribute to student achievement, five of the eight participants who were interviewed (62.5 percent) mentioned software. Four respondents (50 percent) indicated general technology resources and integrating technology into instruction, while three (37.5 percent) cited assessing or documenting learning, computer lab, and local area networks. Two participants (25 percent) mentioned the use of technology in primary grades, other instructional resources, computers in the classroom, tracking of student data, and technology aids in job, life, and future school skills.
Resources, Strategies, and Structures

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

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<td>School M has received grants from businesses in the local community that have assisted the school in the development of its technology and school environment. Four fifths of interview respondents named classroom ambience, and more than one half mentioned hands-on project-based work as key characteristics of School M’s learning environment.</td>
<td>Almost one half of interview respondents referred to classroom management, print resources, and software as characteristics of the learning environment contributing to achievement. Almost one third cited physical space, individuation of instruction, workshop centers/stations, and frequent use of technology. An administrator interview respondent referred to community, parental involvement, and a supplementary enrichment program as the resources used to the development of the school’s learning environment. The administrator referred to teacher commitment to technology, teacher competence, and professional development as resources used to develop the school technology environment.</td>
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School M relies largely on grants, from local companies such as Whirlpool and Dell, to assist in the acquisition of technology resources such as classroom computers. Generally, teachers seem to have what they want and need. As one teacher stated, “If you use it, [the principal] will get it for you. So we are not in demand of a lot of supplies or instructional materials … if we needed it, she would get it for us. Which a lot of principals don’t have that attitude. She would find the money somewhere for us.” The school’s reading teacher/lab coordinator also was reported to be a valuable resource to teachers at School M. This person helps teachers locate materials that are appropriate for the skill and knowledge level of students, and has been integral to School M’s use of reading assessment software from the start and is a strong advocate for this program.

When asked specifically about their classroom learning environment and the resources, strategies, and structures they have used to create that environment, six teachers (86 percent) cited classroom ambience, four (57.1 percent) mentioned hands-on project-based learning, three (43 percent) listed classroom management, print resources, and software, and two (29 percent) reported physical space, individuation of instruction, workshop centers/stations, and the frequent use of technology. When the administrator was asked about resources, strategies, and structures at the school level, community provision of resources and support, other community characteristics, parent involvement, supplementary enrichment program, and field trips were each mentioned. When asked about the resources used to develop the technology environment, the administrator referred to teacher commitment to technology, teacher competence, and professional development.
References


