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

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Case Report on School N

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 & Ronnkvist, 1999), how schools use educational technology (Becker, Ravitz, & Wong, 1999), and conditions under which educational technology have helped raise student achievement (Mann, Shakeshaft, Becker, & Kottkamp, 1999; Chang, Henriquez, Honey, Light, Moeller, & Ross, 1998; Wenglinsky, 1998). On the other hand, qualitative methods enabled exploration of characteristic uses of educational technology in high-performing schools that may contribute to the academic achievement of low-income, African-American, and Latino students.

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

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

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

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

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

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

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

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

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

- Six teachers and two administrators were interviewed during the first site visit.
- Eight classrooms were observed during the first site visit.
- A technology plan and school improvement plan were collected during the site visits.
- Thirty-one teachers (89 percent) returned a survey.
- One administrator (50 percent) returned a survey.
- The school returned a technology infrastructure inventory.
- Three lessons were observed during the second site visit.
Case Background

School N is a Title I school located in a medium-sized city. Current enrollment in the school district is more than 14,000 students served on more than 20 campuses by more than 2,000 employees. The student population served by the district is approximately 50 percent Latino and 40 percent white, with few African-American, Asian/Pacific Islander, or Native American students. More than 50 percent of students in the district are economically disadvantaged, but less than 5 percent are limited English proficient.

School N is one of seven elementary “magnet schools” in the district that offer a “variety of innovative programs utilizing sophisticated technology, hands-on learning, and proven educational strategies.” However, admission to these schools is determined by random selection, with consideration for gender, ethnicity, and space availability. Test scores are not taken into consideration. According to respondents, more than 90 percent of the students at School N reside within the neighborhood around the school and the remaining students are bused to the school through the magnet program.

The school district is the largest employer in the community. However, many residents of the community work for surrounding chemical and industrial plants. Respondents noted that most of these chemical and industrial plants are not located within the school district, and so do not contribute to the local property tax base.

School N serves more than 500 students in Grades PK–5. The student population served by School N is more than 70 percent Latino, and approximately 15 percent white and 15 percent African American; less than 1 percent of students are Asian/Pacific Islander or Native American. More than 70 percent of School N students are economically disadvantaged, and approximately 5 percent are limited English proficient. Most of the teachers are white (more than 85 percent), while about 10 percent are Latino, and 2 percent are African American.

Case Summary

School N teachers have high expectations for students and are committed to meeting individual learning styles. Teachers and administrators have created a distinctive learning environment at the school. Individual students and small groups of students work outside almost every room at rugs, chairs, tables, and floor graphs in the hall. The halls are filled with student work that reflects the strong hands-on philosophy of the school. Students in transition are quiet and orderly, walking in single file lines with hands behind backs. It is clear that discipline is strictly enforced even though students have an unusual amount of freedom to move about inside and immediately outside their classrooms.

The school is distinctive in its philosophy and structure. The school’s theme is one that reflects both its program in mathematics and technology, and its commitment to individual learning styles. The school is divided into three halls, which are designed around three distinct habitats: wetlands, rain forest, and ocean. The teachers and administrators at School N make science a priority for students, emphasizing not only the body of knowledge, but also the scientific thinking that leads to sound decision making. Children focus on skills in observing, developing
explanations, reasoning, and making decisions. Strong science instruction reinforces other programs of study, such as language arts, mathematics, and social studies. Educators at School N cite flexible district policies that have enabled them to create this unique learning environment.

The school has adopted several curriculum packages that teachers and administrators believed were consistent with the school’s philosophy, including High Scope, Reading Styles, Mathematics Their Way, and Activities Integrating Mathematics and Science (AIMS). These packages, along with several supplemental materials, are integrated by thematic units designed by grade-level teams of teachers. Teachers have aligned these units carefully to state standards, and mapped out a sequence for each grade that includes novels and reading homework as well as specific skills in reading, language, spelling, writing, mathematics, social studies, and science. The grade-level teams of teachers use a system they call “Plan-Do-Review” to constantly update and refine unit plans and materials. Teachers also plan instruction to address the variety of learning styles represented in each classroom. Teachers have developed their own forms and checklists for planning and review of units to support these processes.

School N recently used new computers to establish a computer laboratory after the school had experimented with distributing computers to the classrooms instead of having one designated computer laboratory. In addition, a technology specialist was hired to maintain technology resources and serve as the computer teacher. Technology is integrated into the curriculum at School N, and all students frequently use computers in the laboratory and their classrooms.

The school benefits heavily from the presence of a curriculum specialist and a block scheduling structure that allows teachers of the same grade level to meet weekly during school hours. Teachers care about their students and have a true sense of ownership at this school. Teachers also participate in professional development opportunities regularly. This is a highly collaborative school with high expectations for the students.

Teachers at School N reported frequent use of technology, primarily for planning and preparation. When teachers were asked about what professional uses of technology had an impact on their practice, they mentioned creating instructional materials, communicating with staff, parents/guardians, finding professional development resources, presenting information to students, keeping administrative records, and tracking student data.

The administrators at School N are viewed as supportive of teachers and students. The principal focuses on student achievement and shares photos of students who are not meeting state standards with teachers during faculty meetings. In addition, a chart in one of the school’s offices shows the name of students not meeting state standards as well as all the teachers each student has had while at the school. The administrator who returned a survey indicated several priorities for teacher and student technology use at the school including: improving the integration of technology; using more technology in curriculum, instruction, assessment and testing; and individualizing learning experiences. The administrator also reported that use of technology for analyzing data for school improvement, accessing information on best practices, and communicating with others have most influenced administrative practice.
Administrators and teachers at School N use technology to analyze student data to improve the curriculum and set achievement goals. In interviews, the majority of respondents reported that routine test preparation significantly influences student achievement. Survey respondents reported that use of technology to master and remediate skills, writing, improving computer skills, and conducting research also influence student achievement. Teachers reported assigning students to use technology most frequently for remediating and mastering skills, although technology use for analyzing information, conducting research, improving computer skills, exploring concepts, and graphically organizing information and ideas also were cited. Reading skills software, Web browsers, software suite, and mathematics skills applications were named as the software titles that have the most significant impact on student achievement.

According to the teachers and administrators interviewed, grant funds, block scheduling, technology support staff, and other beneficial school policies support technology use at the school. For example, in addition to Title I funds, the school has received a major grant and is always looking for other funding opportunities.

The school also benefits from a strong parent involvement and an after-school homework program. Teachers consider parents part of their school community and often help students and parents in need with things like school supplies or rides to school.
**Research Question:** What *effects on academic achievement* do administrators and teachers in School N attribute to educational technology?

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<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tbody>
<tr>
<td>Two thirds of interview respondents referred to meeting individual needs as a characteristic of School N that contributes to student achievement.</td>
<td>Two fifths of interview respondents referred to teacher care and concern for students as a characteristic of School N that contributes to student achievement. One fourth mentioned administrative leadership, high academic expectations, teacher competence, project-based and interactive learning, and professional development.</td>
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<td>Two thirds of interview respondents referred to practice for standardized tests as a student use of technology that contributes to achievement. One half mentioned students conducting research.</td>
<td>More than one third of interview respondents referred to software use and analyzing test scores as student uses of technology that contribute to achievement. One fourth mentioned using technology for writing and revising.</td>
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<tr>
<td>Teacher survey respondents most frequently reported assigning students to use the software with the greatest effect on student achievement for purposes relating to literacy and mathematics.</td>
<td>Teacher survey respondents reported that reading skills programs, a Web browser, software suite, mathematics skills applications, and multicurricular instruction programs have the greatest effect on student achievement.</td>
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<td>More than four fifths of teacher survey respondents reported assigning students to use technology at least weekly to remediate skills not learned and master skills just taught. Almost two thirds reported weekly assignment for students to express themselves in writing.</td>
<td>Teacher survey respondents reported assigning students to use the software with the greatest effect on student achievement for purposes relating to instruction and research.</td>
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<td>A majority of teacher survey respondents ranked remediating skills not learned and mastering skills not taught among the three purposes of student technology use with the greatest effect on achievement. Most respondents placing remediating skills not learned as the purpose with the greatest effect.</td>
<td>About two fifths of teacher survey respondents reported assigning students to use technology at least weekly to analyze information or solve problems, conduct research, or gather information. About one third reported weekly assignment to improve computer skills and explore concepts models or simulations. One fourth reported weekly assignment to graphically organize information or ideas.</td>
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<tr>
<td></td>
<td>About two fifths of teacher survey respondents ranked expressing themselves in writing and improving computer skills among the three purposes of student technology use with the greatest effect on achievement.</td>
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</table>
When asked about the specific characteristics of School N as a whole that have the greatest effect on student achievement, five (62.5 percent) of the eight teachers and administrators who were interviewed reported on teachers’ efforts toward meeting the individual needs of students. Four (40 percent) respondents cited teacher care and concern for students. Two (25 percent) listed administration leadership, high academic expectations, teacher competence, hands-on project-based/interactive learning, and professional development.

The school is described by one teacher as family-like, based on a clearly defined, close-knit community which includes parents: “As a whole, I can tell that this whole school cares deeply for the children, and that goes beyond their education. It goes for the children; making sure they have warm clothing. We went out of our way to make sure that those kids all have jackets today. And several of them, I know right now, a kid has to go to the doctor, and the mother does not have the vehicle. [Another teacher] is offering to figure out a way to get the kid to the doctor.”

This school environment also is described as one in which teachers experience a great deal of autonomy. Yet, at the same time, teachers know that they have support from the administration as they need it. School N has a curriculum in place that is the direct result of teacher collaboration in the development of it, which has created a strong sense of shared ownership among the faculty. Teachers take a great deal of pride in knowing that they contributed to the curriculum enacted at School N:

“I love the way we teach using our curriculum, and with that goes grade-level planning. I just can’t say enough how important it is that your team works together. And our principal ensures that we have the ability to work together, because we are in on the interviewing process. If a position becomes available in our grade level, we have pretty much the final say on who we hire. She will give us a choice. She’ll say, ‘These six are the top qualified.’ And then we’ll do the interviewing and we end up hiring that person, because she feels we’re the ones that have to work with the personnel.”

Teachers at School N use a variety of assessments throughout the school year to individualize instruction and monitor progress. For example, kindergarten students are administered Early Prevention of School Failure (ESPF), Mathematics Their Way, and the state reading assessments twice each during the year. Teachers also rely on anecdotal notes, a writing checklist, science rubrics, and teacher and student portfolios. In first grade, a reading styles inventory and qualitative reading inventory are added, as well as a fluency check every three weeks beginning in January. In second grade, teachers add preassessments for the state assessment two or three times per year. In Grades 3–5, students take the Scholastic Reading Inventory, the Quick Phonics Screener as needed, and state test preassessments three times before the test in April.

Teachers and administrators cite high expectations as the most important reason for high student achievement at the school. One respondent said, “We walk the walk. A lot of schools say they believe that every kid can learn, but they really don’t.” The current principal, in her first year at the school, projected a photograph of every student who did not meet state standards that year at a faculty meeting to emphasize that there are real children behind the data. A large wall chart in one of the offices continues to show the name of every student who does not meet state standards, as well as the name of every teacher that student has ever had at the school. One
respondent noted, “We’re very competitive at this school, down to the custodians and cafeteria workers.”

When asked about the student uses of technology that have the greatest effect on student achievement, respondents’ responses confirmed that School N is largely committed to the use of technology to help students prepare for state assessments. Five (62.5 percent) of the eight respondents interviewed reported that routine practice and preparation for standardized tests significantly influences student achievement. The many accolades School N has received from the state for high student performance on these tests are evidence that this practice pays off. Four (50 percent) respondents reported student use of technology for conducting research, three (37.5 percent) teachers cited software use and analyzing test scores. Finally, two (25 percent) teachers cited technology used for typing, editing, and writing.

When asked about the type of software with the most significant impact on student achievement, reading skills software (n=13), Web browsers (n=12), software suite (n=10), and mathematics skills applications (n=10) were cited most frequently. Other software listed included multicurricular skills (n=5), multicurricular instruction (n=8), science (n=7), and keyboarding (n=2) applications. Teachers also were asked to indicate what they assign their students to use this software to do. The reported responses were coded by researchers into categories. The most commonly reported purposes were literacy (n=22), mathematics (n=17), instruction (n=15), research (n=11), writing (n=6), and science (n=6).

The technology inventory survey also asked teachers to indicate how often they assign their students to use educational technology for each of 16 given purposes. Twenty-seven respondents (87.1 percent) reported assigning students to use technology daily or weekly to remediate skills not learned, and 26 respondents (83.9 percent) reported weekly assignment to master skills just taught. Nineteen respondents (61.3 percent) reported assigning students to use technology to express themselves in writing at least weekly. More than one third of respondents reported at least weekly assignment to analyze information or solve problems (41.9 percent), conduct research or gather information (38.7 percent), and improve computer skills (35.5 percent). Almost one third reported assigning students to use technology at least weekly to explore concepts, models, or simulations (32.3 percent), and one fourth reported weekly assignment to graphically organize information or ideas (25.8 percent). The purposes for which teachers reported assigning students to use technology least frequently were creating multimedia presentations, creating publications, presenting information to an audience, and publishing their work on the Web.

The survey then asked teachers to select the three purposes from the list of 16 that have had the most significant effect on student achievement, ranking them in order from one to three. Twenty-two respondents (71 percent) cited mastering skills just taught among the top three purposes for technology use, with 17 (54.8 percent) placing it first. Seventeen respondents (54.8 percent) included remediating skills not learned within the top three, with 12 respondents (38.7 percent) placing it second. Thirteen respondents (41.9 percent) included expressing themselves in writing among the top three purposes of student technology use with the greatest effect on achievement, and 12 respondents (38.7 percent) put improving computer skills in the top three. Seven respondents (22.6 percent) ranked conducting research or gathering information among the top
three, and no other purpose was included in the top three by more than four respondents (12.9 percent).

Technology Use

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

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<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tbody>
<tr>
<td>Teacher survey respondents most frequently reported using computers and printers. Most hardware is used on a daily basis in the classroom.</td>
<td>Teachers reported using overhead projectors, digital cameras, cassette players, and projectors (type not specified). Respondents reported using some hardware at home.</td>
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<tr>
<td>Teacher survey respondents most frequently reported using a software suite and Web browser. Most software is used daily and weekly in the classroom and at home.</td>
<td>Teacher survey respondents reported using a word processor and e-mail client.</td>
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<tr>
<td>Teacher survey respondents most frequently reported assigning students to use computers and printers. Teachers assign most hardware daily in the classroom.</td>
<td>Teacher survey respondents reported assigning students to use overhead projectors. Teachers assign some hardware weekly in the computer laboratory.</td>
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<tr>
<td>Teacher survey respondents most frequently reported assigning students to use mathematics skills programs, a software suite, and reading skills programs. Teachers assign most software on a daily or weekly basis in the classroom.</td>
<td>Teacher survey respondents most frequently reported assigning students to use a Web browser, science programs, and multicurricular assessment software. Teachers assign some software for home use.</td>
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<tr>
<td>Teacher survey respondents most frequently reported assigning students to use computers and print</td>
<td>Teachers and students each used computers in one fourth of the observed classrooms, less than one might expect based on survey data.</td>
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</table>

The administrator who returned a technology inventory survey reported daily use of a computer and printer, and monthly use of a scanner, camera, and projector. School N’s administrator reported using all hardware in the office and, with the exception of a projector, at home as well. Software reported by the administrator included daily use of software suite, e-mail, and Web browser applications at both the office and at home.

Teachers who returned a technology inventory survey most frequently reported using a computer (n=30) and a printer (n=30), followed by an overhead projector (n=15), digital camera (n=14), cassette player (n=10), and projector—type not specified (n=8). Most hardware was used daily (n=96), with minimal use weekly (n=18) and monthly (n=13) reported. Most hardware is used by teachers in the classroom (n=109), with some substantial use reported at home (n=46) as well. Teachers reported using a variety of software. The most frequently reported were a software suite (n=54) and Web browser (n=39). Teachers also reported using a word processor (n=16) and e-mail (n=11). Thirteen other types of software were reported, but none more than four times. Most software is used by teachers on a daily (n=93) and weekly (n=43) basis in the classroom (n=116) and at home (n=46).
Classroom observations found less teacher use of computers than one might expect based on survey data. It is likely that most teachers’ use of technology relates to planning and preparation rather than instruction, which would be consistent with the hands-on experiential emphasis of the school. Eight classroom observations were made on site at School N. Teachers used computers in two observations (25 percent), each for duration of less than 5 minutes. Three observations were made of teachers using overhead projectors, and one additional observation was made of use of a presentation station. In three instances, no teacher hardware use was observed. Teachers were also observed using word processing, Web browsing, and operating system software applications.

Student technology use at School N is highly oriented toward basic skills (reading, writing, and mathematics) development, and reinforcement. They do a lot of hands-on work with manipulatives, and a variety of other instructional materials. Teachers who returned a technology inventory survey most frequently reported assigning students to use a computer (n=29) and a printer (n=23). Other hardware use includes overhead projectors (n=8), tape recorders (n=5), audio-visual card readers (n=5), projectors—type not specified (n=5), cassette players (n=4), and digital cameras (n=4). Most student hardware is used daily (n=46) and weekly (n=27) in the classroom (n=70) and computer laboratory (n=24). Teachers most frequently reported assigning students to use mathematics skills (n=39), software suite (n=37), and reading skills (n=31) applications. Other software used by students at School N includes Web browsers (n=15), science applications (n=14), multicurricular assessment software (n=8), multicurricular skills applications (n=7), and keyboarding applications (n=4). This software is largely used daily (n=82) and weekly (n=65) in the classroom (n=141) and at home (n=25).

Classroom observations found less student use of computers than one might expect based on the survey data. Students used computers in two (25 percent) of the eight classroom observations made at School N. One student per computer was observed in both of these classes and two students per computer were observed in one class. Only one observation was made of students using technology other than computers, although the specific nature of this use was not coded. Students were observed using word processing and Web browsing applications, as well as a reading skills program.
**Educational Technology Practices**

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

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<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
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<tr>
<td>Three fourths of interview respondents referred to finding, creating, and updating</td>
<td>One third of interview respondents referred to finding professional development resources</td>
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<tr>
<td>instructional resources when asked about professional uses of technology that have</td>
<td>when asked about professional uses of technology that have affected their practice and</td>
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<td>affected their practices and contribute to student achievement. Two thirds mentioned</td>
<td>contribute to student achievement. One fourth mentioned teacher presentations and</td>
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<td>communicating with staff and parents.</td>
<td>tracking student data.</td>
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<tr>
<td>Teacher survey respondents most frequently reported a Web browser and software suite</td>
<td>Survey respondents reported that using technology for communication, research, and</td>
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<td>among the three software titles with the most significant impact on their practices.</td>
<td>creating documents has had a significant effect on their practices.</td>
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<tr>
<td>Teachers most frequently reported using this software for creating instructional</td>
<td>Almost one half of teacher survey respondents reported frequent use of technology to</td>
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<tr>
<td>materials.</td>
<td>communicate with parents or guardians.</td>
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<td>Almost all teacher survey respondents reported using technology frequently to create</td>
<td>Almost one half of teacher survey respondents ranked communicating with teaching</td>
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<tr>
<td>instructional materials. Four fifths reported frequent use to gather information for</td>
<td>colleagues among the three purposes for technology use with the most significant effect</td>
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<tr>
<td>planning lessons, and communicating with teaching colleagues. More than one half</td>
<td>on their practices. About one third ranked accessing information on best practices and</td>
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<td>reported frequent use for presenting information to students, keeping</td>
<td>keeping administrative records among the top three.</td>
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<tr>
<td>administrative records, and accessing information on best practices.</td>
<td>Classroom observations found a variety of activity structures that facilitate hands-on,</td>
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<td>Almost all teacher survey respondents ranked creating instructional materials among</td>
<td>experiential learning at School N.</td>
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<td>the three purposes for technology use with the most significant effect on their</td>
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<td>practices, and a large majority of respondents placed it first.</td>
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When asked about the professional uses of technology that have the greatest impact on their practices and student achievement, six (75 percent) of the eight teachers and administrators who were interviewed reported finding, creating, or updating instructional resources. Communicating with staff and parents was reported by five (62.5 percent) respondents. Three (37.5 percent) respondents cited finding professional development resources, while two (25 percent) respondents cited teacher presentations and tracking student data. No other response was coded for more than one respondent.

The administrator who returned a technology inventory survey reported the use of a software suite to create administrative materials and maintain records, Web browser for accessing...
information, and communicating with colleagues, and an e-mail application as the most significant uses of software that has had an impact on professional practice. When asked to consider uses of technology based on several specified purposes, the administrator at School N reported using technology most frequently on a daily basis for the purposes of creating administrative materials and communicating with colleagues both within and outside of the school. This school’s administrator uses technology least frequently to present information to teachers or students. When asked to rank the top three technology uses from this list, the administrator ranked analyzing data for school improvement, accessing information and research on best practices, and communicating with other staff at the school as first, second, and third, respectively.

Teachers who returned a technology inventory survey most frequently reported a Web browser (n=22), software suite (n=20), word processor (n=7), and e-mail (n=7) among the top software titles that have had the greatest effect on their teaching practice. Teachers also were asked to report what they use this software to do, and the reported uses were coded into categories. Multiple uses for a given software title were each coded into the appropriate category. The most commonly reported purposes of use were instructional materials (n=21), communication (n=15), research and information finding (n=11), and document creation (n=8).

The technology survey also asked teachers to indicate how often they use technology for each of 10 specified purposes. Twenty-nine respondents (93.5 percent) reported using technology daily or weekly to create instructional materials. Twenty-six respondents (83.9 percent) reported at least weekly use to communicate with teaching colleagues, and 25 (80.6 percent) reported weekly use to gather information for planning lessons. More than one half of respondents reported daily or weekly use to present information to students (67.7 percent), keep administrative records (61.3 percent), and access information on best practices (51.6 percent). Fifteen respondents (48.4 percent) reported at least weekly use to communicate with parents or guardians. The purpose for which teachers least frequently reported using technology as publishing student work on the Web; 90 percent of teachers reported monthly or less use of technology or this purpose.

The survey then asked teachers to select the three professional purposes from the list of 10 that have had the most significant effect on their practice, ranking them in order from one to three. Twenty-eight (90.3 percent) of teachers included creating instructional materials among their top three, and 22 (71 percent) placed it first. Fifteen (48.4 percent) listed communicating with teaching colleagues among their top three. Thirteen (41.9 percent) teachers listed gathering information for planning lessons among their top three, and 12 (38.7 percent) included accessing information on best practices. Ten respondents (32.3 percent) ranked keeping administrative records among the professional purposes of technology use with the greatest effect on their teaching practices.

Teacher use of technology at School N takes place primarily during planning and preparation time rather than during instruction. Interview respondents described how they use technology to support data-based monitoring of student progress, for example. “I am able to enter grades on a program that will automatically average. So, if I’m worried about a student, I don’t have to go back in and refigure and recalculate. Every time I put in a new grade, I can average his grades.
And I think I’ve been in much better contact with parents and much more able to tell them ‘your child is borderline failing,’ and I can pick up that information in a second. That is pretty much my favorite part of that aspect of it. The whole paperwork thing is just cut in, not even half. It’s about an eighth of the time that it used to take.” Respondents also mentioned the convenience of being able to save lesson plans and other instructional materials to a file server.

All classroom observations made at School N occurred in K–5 classrooms. One observation was made in each of the following classes: kindergarten, first grade, second grade, and fifth grade. Two observations were each made of fourth-grade and fifth-grade classes. Seven observations were conducted in a classroom setting, while one occurred in the school computer laboratory. Eight different activity structures were observed in these classes. Eight observations were made of the adult-led, large group structure, six of the individual structure, five of collaborative small-group work, two of collaborative pairs, and one of each of the following: student-led large group, peer tutoring, and rotating centers. In four classes, the adult-led large group structure was dominant; the individual structure was dominant in two classes; and the rotating center, collaborative small group, and student-led large group structures were each dominant in one observation.

**Educational Technology Policies**

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<thead>
<tr>
<th>Research Question: What <em>educational technology policies</em> do administrators and teachers in School N implement?</th>
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<tbody>
<tr>
<td><strong>Primary Characteristics</strong></td>
</tr>
<tr>
<td>One half of interview respondents referred to money or grants as a state or district policy benefit to educational technology use, and the same number of respondents mentioned Internet use policies as an obstacle.</td>
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<tr>
<td>No state or federal policy benefits or obstacles were identified by more than one administrator interview respondent.</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 N who completed a survey indicated the highest priority for eight of the 20 objectives: improving teachers’ strategies for integrating technology, using more technology in curriculum and instruction, using more technology in assessment and testing, individualizing student learning experiences, better preparing students for careers, improving students’ computer skills, improving students 21st century learning skills, and improving administrators’ computer skills. The majority of the remaining 20 objectives were cited as moderately high priorities: improving teachers’ computer skills, increasing professional development opportunities for teachers, improving student achievement on state assessments, improving students’ basic skills, improving
administrative efficiency, supporting school reform efforts, improving parents’ computer skills, increasing parental involvement, and publicizing school and student accomplishments.

When asked about school or district policies that help School N use technology in ways that contribute to student achievement, four (50 percent) of the eight teachers and administrators who were interviewed cited money or grants. Three (37.5 percent) cited plans, policies, and standards, and two (25 percent) mentioned technology support for staff, and communication with staff, parents, and others. No other response was coded for more than one respondent. When asked about school or district policies that make it more difficult to use technology in ways that contribute to student achievement, four (50 percent) of the eight respondents interviewed cited the school’s Internet use policies. Additionally, three (37.5 percent) respondents stated that there are no specific obstacles or they were aware of none.

School N has a district improvement plan. The general attitude is that policies are set to ensure a minimum level of achievement, and as a magnet school they feel that they exceed those policies. Data are used by School N teachers and administrators to revise curriculum and set goals for student achievement in reading, mathematics, and writing. Teachers participate in comprehensive curriculum review, revision, and development in response to achievement data. For example, the school’s campus improvement plan details school goals related to improved achievement with an action plan that includes checking curriculum alignment with state assessments; training staff in a variety of innovative teaching techniques; and increasing the number of meaningful hands-on experiments in the science laboratory. State assessment updates and instructional strategies are routinely presented at monthly faculty meetings, in parent newsletters, and at PTA meetings.

Further, the policies dictated by the plan appear to be flexible and open to change. One teacher observed that:

“The district has been pretty free in allowing school choices. We put together our own policies and we have a school improvement plan that we work on yearly, two or three times a year. We rewrite it every five years. And I think if you have a school board that thinks that they can make all of the policies for every school, if it’s a fairly large district, they’re not going to be real successful because every school is different, every population is different. And we know better how to meet the needs of our students. So, I think this district has been pretty free in allowing us, –with— we turn those in and they look them over, and I think if we did bizarre things, they might come back and say, I don’t think that’s going to work. But pretty much they allow us the freedom to make our own choices. And I think as long as we’re successful, that we’ll be given that freedom.”

The school’s self-designed curriculum is aligned to the standards, and teachers believe that there are no gaps between the two. Thematic units are enacted within the curriculum to address the standards, which serve as a baseline for student performance. While test preparation software is viewed as important to students in this process, it is not heavily utilized for this specific purpose. School N has “a curriculum specialist who helps us and helps ensure continuities throughout the grade levels. We make sure we’re not leaving out any objectives, that there is flow from one grade level to the next. And I really, I firmly believe it’s so important that these children receive valid instruction that’s meaningful to them, rather than just what someone in [state] chooses to
put into a textbook.” Teachers strive to push their students to exceed beyond what the standards dictate. The school makes it a policy to conduct continuous assessments, through formal and informal means, to measure comprehension and prepare students for state assessments. It is clear, then, that most respondents at School N have a favorable view of school and district policies, and view themselves as being an important component in both the development and enforcement of these policies.

School and federal policies do not appear to be major factors for School N in terms of how they implement and use technology. In terms of state and federal policy benefits to the school, no single response was coded for more than one administrator. In terms of federal policy obstacles, two (100 percent) administrators reported that there were none, at least that they are aware of.

Technology Capacity

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<tr>
<th>Research Question: How does the technology capacity of School N affect administrator, teacher, and student use of educational technology?</th>
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<tr>
<td><strong>Primary Characteristics</strong></td>
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<tr>
<td>Technology is accessible to both students and teachers, with an average of 2.5 computers per classroom. All computers are networked and connected to the Internet, but about one half have older processors.</td>
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<tr>
<td>The school has a computer laboratory with 29 computers, all of which have newer processors and are connected to the Internet.</td>
</tr>
<tr>
<td>Two thirds of interview respondents referred to the computer laboratory and computers in the classroom as characteristics of School N’s technology environment that contributes to student achievement.</td>
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On the technology infrastructure survey, School N reported owning a total of 169 computers, with an average of 2 computers per administrative office, 1.2 computers per staff office, five computers in the library, 29 computers in the laboratory, and 2.5 computers per classroom. Approximately one half of the school’s computers are older models, with 61 of those computers located in classrooms, one in the administrative office, and one in the library. The remaining 106 computers are newer models capable or running current software applications, with the majority of these computers concentrated in the computer laboratory and in classrooms. School N reported that all of its computers are connected to a 100MB local area network (LAN) and all have a DSL connection to the Internet. In every major location on campus where there are computers, laser printers are present as well; there are two shared between the administrative offices, one shared between the staff offices, two in the library, one in the computer laboratory, and 45 distributed among the school’s 48 classrooms. The school also reported having two LCD
projectors in the computer laboratory. According to the survey, School N has LAN and e-mail servers.

On the software inventory section of the survey, School N reported owning a total of 21 different software titles: three productivity tools, two communication tools, one media tool, seven educational software applications, and four administrative software packages. The productivity software included three software suites. In terms of communication tools, the school owns two e-mail applications. The media tool owned by School N is a digital imagining application. Educational software titles focus on reading and mathematics skills, multicurricular assessment, and science and social science content areas. Finally, the only administrative software coded was a technology management application.

When asked what characteristics of School N’s technology environment facilitate the use of technology in ways that contribute to student achievement, five (62.5 percent) of the eight respondents cited the school’s computer laboratory and the accessibility of computers in the classroom. Three (37.5 percent) respondents mentioned research by students, via the use of computers, e-mail, and the Internet, and technology used for typing, editing, or writing. Finally, two (25 percent) respondents stated the following characteristics: familiarity of students with technology; content-specific strategies; general technology resources; student emphasis on learning basic technology skills; technology aids career, life, or future school skills; technology is only a tool; the frequent use of technology; the provision of professional development for technology use; and use of technology for analyzing test scores.

Every observed classroom at School N had at least three computers with access to the Internet and network printers, and some had up to 11 computers. According to respondents, the higher grades and special education classes tend to have more computers. One of the main technology challenges for the school is the mix of old and new equipment. Because some computers are much more up to date than others, the technology specialist has not been able to create an environment where a teacher or student can sit down at any workstation and have access to the same resources they would have on any other workstation in the school.
**Research Question:** What resources, strategies, and structures does School N use to become a high-technology school, and to what extent are these integrated with other school improvement efforts?

<table>
<thead>
<tr>
<th>Primary Characteristics</th>
<th>Secondary Characteristics</th>
</tr>
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<tbody>
<tr>
<td>More than four fifths of teacher interview respondents referred to overall ambience as a characteristic of their classrooms that contributes to student achievement, reflecting School N’s emphasis on providing physical spaces that accommodate individual learning styles. One half mentioned desk arrangements, individualized instruction, hands-on learning, and centers or workshops. Both administrator interview respondents referred to the following as resources used to develop this school’s characteristics: individualized instruction, reviewing concepts, money or grants, professional development, tracking student data, and curriculum alignment with standards.</td>
<td>One third of teacher interview respondents referred to self-directed learning and classroom materials and supplies as characteristics of their classrooms that contribute to student achievement. After initially choosing to dismantle a computer laboratory and deploy computers in classrooms, School N recently used new computers to establish a laboratory, and hired a new technology specialist who also serves as the computer teacher.</td>
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</table>

When asked about the classroom learning environment and the resources, strategies, and structures they have used to create that environment, five (83.3 percent) of the six teachers interviewed cited the overall ambience of the classroom. Three teachers (50 percent) cited desk arrangements, individuation of instruction, hands-on project-based learning, and center/workshop station configurations. Two (33.3 percent) teachers mentioned self-directed learning, and classroom supplies and materials. In interviews, one teacher commented that the reconfiguration of the classroom, from row and column seating to a more comfortable arrangement of round-table seating, has had implications for students’ comfort levels, which, in turn, contribute to their productivity and overall performance in the classroom.

When administrators were asked about resources, strategies, and structures at the school level, both (100 percent) administrators interviewed cited the individuation of instruction, reviewing concepts, money or grants, professional development, tracking student data, and curriculum alignment with standards. In terms of the characteristics that contribute to the development of the school’s technology environment, no responses were coded for more than one administrator. School N has pursued multiple grants to develop alternative instructional opportunities for students; the explicit goal of this activity is to use the money obtained to enhance the educational experiences of students. One administrator summarized the school’s approach to resources this way: “We have written for grants, but I think all of our resources, the use of the resources, is focused on what is needed to better teach the kids, not what is wanted by the teachers in the classroom. And by doing that, I squeeze every penny out of what we have to make sure that everything goes back to the children.”
Substantial effort is spent in allocating instructional resources for teachers that will improve their practices in the classroom, largely accomplished through professional development opportunities. The school has a curriculum specialist who helps facilitate this process for teachers, and has some experience in technology integration as well. The curriculum specialist frequently attends workshops based on teacher recommendations, and returns with ideas that will assist teachers with their practices. This person is described as the intermediary between teachers and administrators who assists staff in the allocation of resources they need to do their jobs more effectively.

Until the current school year, technology integration was focused primarily on skills development in the classroom with software selected by teachers. The school used to have an Integrated Learning System (ILS) computer laboratory that was disbanded by the current principal. One respondent noted, “It was just another place to dump your kids for 30 minutes.” The computers from the laboratory were relocated in classrooms. The federal funding has enabled the school to purchase at least three new computers and a printer for each classroom in 1995 and 1996. At that time, the principal required that teachers submit lesson plans via e-mail. Subsequent funds have been used to upgrade and increase the number of computers in classrooms. Title I funds and a recent Beaumont Foundation grant also support technology at School N.

In 1998–99, the school decided to take a closer look at the software available to teachers in the classroom. Administrators and teachers at School N see the computer as “just another manipulative” that is effective because so many of their students are visual and tactile learners. In selecting software programs for classroom use, teachers read evaluations of educational software on the Internet and used trial copies of different programs during their block time. Teachers looked for programs that were interactive and animated. The principal left the decisions about what programs to buy to teachers so they would be more likely to use the software in their classrooms.

In 2002, the school purchased equipment to reopen a computer laboratory. The focus of the new computer laboratory is to develop student technology proficiency with productivity tools, the Internet, digital cameras, and scanners. This decision was motivated by a sense that, although students were using computers in their classrooms for very specific purposes, they were not learning how to use technology in general. The principal also hired a new technology specialist who could teach students and work with other teachers to integrate technology into the curriculum. The new specialist meets informally with teachers, taking content the teachers give her and creating lessons that will develop students’ technology skills. In contrast to the old ILS laboratory, classroom teachers stay with their students during the weekly 45-minute period in the new computer laboratory. The principal plans to make this process more formal next year, alternating grade-level team meetings between the curriculum/reading specialist and the technology specialist.

**Classroom Vignettes**

Three lesson observations were conducted at School N. The first observation was of 13 fourth graders in a mathematics class. The second was of 17 second graders in a combined social studies and mathematics class. The third was of 16 third graders in a mathematics class. All
observed lessons took place in classrooms. In each case, teachers were interviewed before the lesson to establish a context for the lesson observation that followed and an understanding of how instructional strategies and technology will be integrated to facilitate student learning. Teachers also were interviewed following each observation to provide a lesson interpretation and an understanding of the role of technology in achieving specific lesson outcomes. Of the three observations, two involved the use of technology; these two observations are described below.

**Second Graders in a Social Studies Class**

<table>
<thead>
<tr>
<th>Class 2</th>
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</thead>
<tbody>
<tr>
<td>Grade:</td>
<td>2</td>
</tr>
<tr>
<td>Subject:</td>
<td>Language arts, social studies, math</td>
</tr>
<tr>
<td>Setting:</td>
<td>Classroom</td>
</tr>
<tr>
<td>Teacher Hardware Used:</td>
<td>Computer</td>
</tr>
<tr>
<td>Teacher Software Used:</td>
<td>Web browser, social science</td>
</tr>
<tr>
<td>Student Hardware Used:</td>
<td>Computers, audio player</td>
</tr>
<tr>
<td>Student Software Used:</td>
<td>Web browser, social science</td>
</tr>
</tbody>
</table>

Before the lesson, the teacher stated that students would be working in workshops (reading, writing, and social science) and that they had just started a rainforest unit. The workshops have various links across the curriculum. For example, students will make and interpret a graph, use the Internet for research, and read books. The teacher planned to have students use CD-ROMs and the Internet during the lesson. The teacher also planned to assess students by talking to students at workshops, observing their work, and taking anecdotal notes.

This observation took place in the second-grade classroom, which was equipped with four desktop computers, six audio players, a printer, overhead projector, video player and television. In addition, the room was equipped with manipulatives, reference books, textbooks, and trade books, and the classroom walls were decorated with student work and visual prompts. During the lesson, 17 students were in “workshops” associated with a rainforest unit. As the observation began, the room was bustling as students settled into working individually and in small groups at different workshops. Four students were making trail mix, measuring and counting the ingredients. One student was listening to an audiotape and following along in the book. Four students were coloring the layers of the rainforest.

Eight students were at three of the four computers located on a table at one side of the room. Students seemed to have grouped themselves around the computers, and the groups were fluid. Some of the students at the computers were reading Web sites and some were using a CD-ROM. One group went to Yahooligans and typed “rainforest” in the search box. Another group could not get a particular Web site to load and expressed some frustration. There was a great deal of discussion among students at the computers, as well as those in other workshops. Students used the computers for 5–15 minutes or more than 15 minutes. The teacher circulated among the groups. Students in all workshops were self-directed and stayed on task.

About halfway through the observation, the same four students were still coloring the layers of the rainforest. Most of the other students have moved to a different workshop, which they are
free to do provided there are no more than four students at one workshop at one time (the “four, no more” rule). Four students also were observed using a large floor graph in the hallway, placing plastic dinosaurs on the graph to solve mathematics word problems. These students, who had taken off their shoes so they could walk on the graph, worked well together even when the teacher was in the classroom and they were unsupervised. When the teacher walked out into the hall to check on this group, the students were very eager to share what they were doing.

The teacher’s role was primarily checking for understanding in the various workshops, although occasionally the teacher redirected or facilitated students. When one student was not engaged in any center, she asked, “Baby, what are you doing? If no workshop is open, what are your instructions?” The student replied, “Do my weekly workshop,” and got back on task. The teacher showed another student at the computer how to use bookmarks. The teacher also checked with several students to make sure they had listened to an audiotape. After students listen to the audiotape, they must read the book themselves to another student. The teacher asked the student, “Who did you read to? What’s the rule?” The student replied, “Read to somebody,” and quickly found another student to read to. The teacher then asked this student to read the book for her and keep up with her finger as she moved it over the words. This fluency check attracted an audience of several students. When the student finished the book, the teacher told him he had done a good job and was ready for another book. The audience scattered back to their own workshops without a word from the teacher.

After the observation, the teacher was pleased with the work students completed in their workshops; however, the teacher was disappointed that the computer workshop did not go as well as planned because the computers froze. The teacher commented that students still needed to practice their computer skills noting that they needed help opening programs. However students are eager to use computers. For example, when students have “planning time” when they can plan their own work, they usually choose to use computers. While the teacher encourages students to use software for skills practice, the teacher feels that computer use is limited by the age of the computers and would like more up-to-date computers to eliminate problems like those encountered during the observation. The teacher felt that having students work in groups (the “four, no more” rule) helps them learn what they need to know and allows the teacher to identify areas that need to be reviewed.

### Third Graders in a Mathematics Class

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<tr>
<th>Class 3</th>
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<tbody>
<tr>
<td>Grade:</td>
<td>3</td>
</tr>
<tr>
<td>Subject:</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Setting:</td>
<td>Classroom</td>
</tr>
<tr>
<td>Teacher Hardware Used:</td>
<td>Overhead projector</td>
</tr>
<tr>
<td>Teacher Software Used:</td>
<td>None</td>
</tr>
<tr>
<td>Student Hardware Used:</td>
<td>Computers</td>
</tr>
<tr>
<td>Student Software Used:</td>
<td>Web browser, reference</td>
</tr>
</tbody>
</table>

Before the lesson, the teacher stated that students would understand the concepts of area and perimeter because of the day’s lesson. In addition, students would learn about the geography of
Africa, including geographic terminology. The teacher planned to have students work in collaborative groups in workshops on several hands-on activities. Students had a pretest at the beginning of the unit and would be assessed by a posttest at the end of the unit. In addition, the teacher would use a rubric to assess student project. During the lesson, the teacher planned to assess students by taking notes while students are working in groups and reviewing the work that they would turn in.

The observed lesson took place in the third-grade classroom, which was equipped with three desktop printers, four audio players, two calculators, and one overhead projector, video player, and television. Sixteen third-grade students were finishing a worksheet and transitioning into workshops as the observation began. The teacher was working with four students at the overhead projector, and other students moved to their workshops and got on task without any direction from the teacher. One student was at one of the three computers in the classroom typing “Africa” into a search engine. Four students were using laminated graph paper to solve area problems. One student was still working on the worksheet. The remaining students were starting new workshops; one workshop on probability in the hall and another on perimeter in the classroom. The teacher left her group briefly to check on other students. The students in that group had handheld whiteboards on which they are solving a mathematics problem from the overhead. A teacher’s aide was available to assist students.

The student at the computer continued to search, typing “Africa deserts” into a search engine and appeared to have difficulty finding the needed information. Another student sat down at a different computer and read about Africa using reference software. The first student became frustrated with his search, saying, “I’m going to the book now.” At this point, the teacher’s aide walked over to the computers to assist him. A third student sat down at another computer and located a map of Africa. The students using the computers were in the landforms workshop. Some students were observed using the computer for less than 5 minutes while other used the computer for more than 15 minutes.

The four students working with the teacher remained in that workshop for most of the observation. In the interview after the lesson observation, the teacher described specific mathematics skills that she was reinforcing with these students based on previous assessments. During this workshop, a student drew a problem out of a plastic bag and the teacher put the problem on the overhead. The teacher asked, “What is my strategy on this?” and the students replied, “Draw a picture!” As was the case in the fourth-grade classroom, this teacher is very skilled at using the overhead to guide students through mathematics problems in a way that keeps them actively engaged. Just before the end of the observation, the teacher released the group at the overhead, reminded them of the “four, no more” rule, and called four new students to join her.

After the lesson, the teacher felt that most students had a good grasp of the concepts of area and perimeter, adding that their worksheets would be graded later. The teacher noted that the practice worksheets were presented in a format similar to that of the state achievement test. The teacher felt that students also did well with the geography portion of the lesson as the class had started working on landforms the week before. The teacher had not planned to have students use the Internet until a lesson on animals had been introduced, but felt that the students did well on their
research. The teacher felt that hands-on activities and the ability to move during the lessons contribute to student learning in general.

In each classroom, the school’s emphasis on individual learning styles, a comfortable learning environment, and hands-on learning was evident. Overhead fluorescent lights were turned off and table and floor lamps placed around the room provided light. The walls were filled with visual prompts, and shelves and storage bins contained trade books and manipulatives.

In lessons, students and teachers shared a comfortable rapport and students moved around the classroom freely. Teachers used different areas of their classrooms and the hallway for various instructional techniques. In both observations of primary grades, students were engaged in self-directed work at workshops with some guidance from the teacher. In both cases, students were on task and transitions between workshops occurred with little direction from the teacher. Students used software in both lessons to conduct research that would reinforce learning of the day’s lesson or unit.
References


