Newsome Park Elementary School
Case Report from the
U.S.A. Exemplary Technology-Supported Schooling Case Studies Project

Newsome Park Elementary: Making Learning Meaningful through Project-Based Learning Using Wireless Laptops in a K-5 Math, Science, and Technology Magnet School

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Newsome Park Elementary: Making Learning Meaningful through Project-Based Learning Using Wireless Laptops in a K-5 Math, Science, and Technology Magnet School

Case Overview

Newsome Park, a K-5 school with 770 students, sixty-percent of whom are minority, is a magnet school in math, science, and technology. A large number of laptop computers are linked wirelessly to hubs for shared activities and Internet access. The wireless laptops supports flexible distributions to classrooms so small groups of students can use networked computers on a fairly regular basis. A central tenant of their reform effort is to utilize student interests and discussion to drive the direction and character of projects, which are usually long-term and interdisciplinary. Teachers then to adapt instruction to project needs.

An essential feature of their schoolwide program was for every teacher to participate in a school-based, intensive, forty five hour, technology-focused professional development experience. A representative leadership team of administrators and teachers guided this and other school improvement features. A wide variety of software packages and learning activities were available for the teachers and students to use. This kind of instructional technology support has made it possible for some teachers to implement some advanced techniques such as concept maps with young children.

Implementation Context

History of the Innovation

The Newsome Park staff formally adopted the current format of project-based learning during the 1999-2000 academic year but this approach grew from efforts to provide relevant, real-world experiences to engage students in meaningful learning tasks that they began when the school first opened in 1995. The progress of this effort was aided by school leadership, a professional development grant led by a schoolwide leadership team, new ICT purchases the result of a need to be Y2K compliant, and the State's Standards of Learning (SOLs).

The school's mission, adopted upon its opening, served as a guide to the school staff's beliefs, responsibilities, and vision of what learning should look like. It was used regularly to assess their successes and chart direction. The principal reported that when they consider important curriculum or assessment modifications or seek best practices they ask Is that a mission decision? or Where does that fit in the mission of the school? The mission was regularly reviewed, clarified and amended if necessary.

In spring 1999, due to low scores related to the Virginia Standards of Learning (SOL), Newsome Park had received a warning from the State Department of Education. Consequently, the

principal, the Constructivist Teaching and Coaching (CTAC) committee, and the teaching staff made it a major priority to align the district's curricular content and requirements and its use of ICT to the state's SOLs. The warning provided a test to their commitment to their mission, and they considered revamping it. When they concluded their and students' work needed to be more meaningful to the community, which was enlarged from the concept of families to include district's (division's) state's goals (i.e. the SOLs), what eventuated was a firm resolution to implement problem based learning. The CTAC published a written school improvement plan that guided the implementation of project-based learning and articulated how technology could be used to support that approach.

Prior to our visit during the 1999-2000 school year, each classroom had four stationary IBM 486 computers, containing software and interactive courseware that emphasized skill development. The teachers and principal reported that the old equipment and software were used only sparingly for drill and practice because they did not adequately match their curriculum or their instructional approach. Because of Y2K, the school staff had an opportunity to select new technology tools.

The shared teaching philosophy and values, collaborative teaching culture, and the schoolwide commitment to project-based learning provided the staff with a strong base from which to select and implement educational technology tools. The school's principal and a team of volunteer teachers wrote a successful $150,000 grant proposal in 1998 and formed the Constructivist Teaching and Coaching (CTAC) school improvement team consisting of 9 teachers representing all grade levels to lead the grant activities. The generous support ($150,000) of the Comprehensive School Reform Demonstration grant supported the staff in planning, training, and learning to use the educational technology as a support to project-based learning. At the beginning of the 1999-2000 academic year, the school installed a wireless network with an Apple Macintosh platform.

School Culture, Professional Community

Since the school opened in 1995, Newsome Park's vision for teaching and learning has gradually developed under the leadership of the school's principal and teachers. The principal handpicked an entirely new staff, deliberately hiring a mixture of novice and experienced teachers and staff who believed that students construct their own knowledge and come to a deep understanding through active experiences. In the years following the school's inception to formal implementation of the innovation, the principal and staff experimented with a variety of innovative instructional movements, including student projects, character education, and service learning. The principal expressed that their earlier efforts to use innovative teaching approaches was an important precursor to project-based learning.

The principal's leadership role at Newsome Park can be defined as strong yet collaborative. He made a concerted effort to select teachers and other staff members (e.g. technology integration specialists, resource teachers, librarians) who were committed to the school philosophy. Teachers credit him with creating an environment where they could learn and experiment and they also acknowledge that he is willing to share leadership with teachers and staff.

The breadth of the shared leadership for its implementation indicated that the innovation appears to be deeply integrated into the prevailing school culture. The ideas the staff formulated for the Comprehensive School Reform Demonstration grant proposal and the resources they received from the grant award helped to build a consensus on a common view of learning, the project-based model of instruction, and the use of educational technology to support it. The plan also highlighted the importance of professional development for all teachers and the requirement that they use technology tools and collect evidence of student work using spreadsheets, databases, word processing, multimedia, and communications tools that would be shared at quarterly grade-level instructional meetings.

Since the school's inception, the staff has worked has regularly collaborated on substantive issues. This collaboration has lead to several schoolwide efforts: a representative leadership team, a successful grant proposal, and a project-based learning format that includes teachers' sharing their classes' work with the rest of the school.

Technology and Technology Support Structure

The educational technology infrastructure at Newsome Park included 25 stationary iMac computers installed in a lab and each classroom with three laptops (2 iBooks and the teacher's PowerBook) and an iMac with a DVD drive; there were 12 additional iBooks available for checkout in the technology lab. Each classroom also has a color printer and a telephone. A wide range of peripheral equipment was available from the technology lab.

Because the laptops are portable and battery-powered, they could be used anywhere in the classroom and still be connected to the Internet, as long as they were within the range of a ceiling-mounted teleport. The wireless and laptop configuration was a key characteristic of the integral use of technology for project-based learning, enabling teachers and students to seamlessly and flexibly use technology in the classroom. In describing the flexibility of the new laptops, one teacher said "...it's convenient having the iBooks that they can take back to their seats because they can talk to the person beside them about what they are doing on the iBooks or they can get up and somebody can come over and help them..." (Teacher Interview, T104). In addition, the laptops allowed teachers to share these finite hardware resources, they easily moved from classroom to classroom---wherever they were needed. Under the previous arrangement with the stationary IBM 486's, students had to move to the back of the classroom and try to create space around the computer in order to use software.

Like the portability, the wireless networking of the laptops can be viewed not only as an added convenience, but also as an additional feature that adds value to the technology. The wireless network enhanced the usability and value of laptops by providing a network connection wherever they were taken in the school, including up to 150 feet outside of the school. We observed student using their laptops in classrooms, in the halls, and in the library, the portability not diminished by needing to be tethered to the wall by a network connection. Thus, teachers could concentrate on the placement and groupings of students that made the most sense for the learning, not based on hardware needs. Furthermore, if they borrowed others' laptops, they didn't

need to worry about loading and moving around files because they would always be able to access from and save materials to a central network location.

Software included integrated applications (containing spreadsheets, database, and word-processing tools), multimedia software (e.g. PowerPoint), and communications software (e.g. Netscape).

The school was unique in its district because it had two technology support staff that provided software integration support, technical support to teachers and students, training for students, and trouble-shooting for the network. An outside vendor (FutureKids) provided 45 hours of customized, hands-on instruction to teaching staff from computer basics, to telecommunications, multimedia, and instructional unit creation. This training was required for all teachers who received the school district-provided laptop. As of the site visit, every teacher except for two had taken the intensive FutureKids training.

An outside vendor (FutureKids) provided 45 hours of customized, hands-on instruction to teaching staff from computer basics, to telecommunications, multimedia, and instructional unit creation. This training was required for all teachers who receive the school district-provided laptop. In general, teachers expressed satisfaction with the current technology infrastructure because it was better aligned with the school's instructional goals and it provided greater flexibility and reliability than the previous platform.

Context Beyond the School

Federal funding for ICT also played an important role in supporting the innovation at Newsome Park. Newsome Park teachers, with some grant writing support from district personnel, obtained a $150,000 Comprehensive School Reform Demonstration (CSRD) grant from the U.S. Department of Education. Administered by the CTAC school committee, this grant funded a range of activities that supported the school's adoption of project-based learning. The FutureKids professional development course (integrating technology into instruction), release time and substitutes for teachers, stipends for CTAC members to do summer curriculum development, and conference costs for selected teachers were among the different items funded with the grant.

Virginia's state policies affected the school through the Virginia Standards of Learning (SOLs). These standards are minimum learning objectives for students in all content areas from grades K-12. By 2007, all students must meet these standards in order to graduate. And school accreditation was dependent upon a schoolwide 70% pass rate.

The city of Newport News was an important partner in helping the Newport News School District fund its technology and infrastructure. Working together, they crafted a five-year plan and put into place a foundation to help raise money to fund it. Regional and local businesses were asked to invest in the community by contributing to the foundation. Over a five-year period, they set a goal of $45M dollars of funding for technology, to be shared throughout the forty-five schools and centers in the district. Newsome Park Elementary was one of the first two schools in the district to benefit from this additional funding.

Improvement in Teaching & Learning

Curriculum and Assessment Aspects of the Improvement

Project-based learning at Newsome Park primarily changed how the curriculum was delivered and organized. The teaching staff at Newsome Park had exerted considerable effort to link the district curriculum goals and content to the Virginia Standards of Learning (SOLs). This effort resulted in the development of a range of teaching activities that addressed these minimum standards through project-based learning. The staff decided to implement project-based learning through three distinct phases: planning, fieldwork, and celebration of learning. During the planning phase, through brainstorming the students determined the questions to answer. Phase two was the fieldwork, consisting of field trips, field studies, and research to delve into the problem or the topic in more detail. Phase three was the celebration of the learning, a presentation of the projects to an outside audience.

Because in the planning stage students brainstormed and posed questions in order to identify a relevant problem to study, they helped to determine the specific content of the curriculum. The teachers explained that throughout the fieldwork stage they guided the students' discussions as they determined the next questions to pursue as a part of the project, but by and large the direction the project took was chosen by the students. The teachers then planned how they could address the SOLs through the students' project work. In the focus group, a fifth grade teacher whose class studied light rail systems in five different cities in the U.S. and Europe explained how she was pleased to find that she could let the project set the direction and still be sure to attend to the SOLs; other teachers in the group agreed.

In each classroom the overall amount of time spent on a project throughout the year varied. Some students became very enthusiastic about the project and so it was more significant in scope; projects developed in other classes were smaller and thus the class worked on it more infrequently, instead more often following the "regular curriculum". Thus, the project-based learning innovation varied in intensity and duration among the school's classrooms.

Teachers at Newsome Park facilitated the implementation of the innovation by completing a weekly work plan. These plans identified the SOLs to be addressed and outlined the concepts, skills, questions, and assessment strategies related to the curriculum area. Teachers submitted this information to the principal and shared it during their weekly grade-level meetings. Another facilitating factor for the project-based approach was looping. This means that the students and teacher stay together for two years. Thus, all of the teachers at this K-5 school taught at least two grades, kindergarten and first, second and third, fourth and fifth. Because project-based learning depends upon students' collaboration skills, a positive classroom community and their understanding the alternative assessment strategies, spending a longer period of time together as a class contributed positively to all these outcomes.

From the beginning of Newsome Park's history, teachers developed rubrics for a variety of content areas to assess student performance. With the advent of the SOLs, teachers tried to use the rubrics to assess their students with the standards in mind. The shift toward projects fostered

an appreciation of alternative ways of assessing what students take away from their learning experiences. Project-based learning prompted teachers to provide students with ongoing assessment feedback on their learning throughout each phase of the project. Students gave each other feedback on their work at different stages during the project. Standard paper and pencil assessments (e.g. practice for standardized tests) remained important forms of assessment.

Project based learning can be completed without technology, but tool software readily lent itself to student-made products that were an essential component of project based learning. This technology was used to design and create products and presentations related to the class projects underway, rather than for the drill and practice of facts. Internet resources were often a key resource in projects as students sought information and to support the teacher's need for resources so as to allow the project to evolve to match students' interests.

While the laptop and wireless characteristics made it easier logistically to use the computers in the classroom, the tool software was probably the most important reason the staff viewed their use of technology as essential in supporting project-based learning. The integrated software applications are flexible tools that were creatively used in project-based learning. This ranged from generating a graph based on collected data, or using an application to create a product. Typically, one student worked at the computer while the other offered suggestions or advice about completing the task. From our observations of pairs of students engaged in work at a laptop computer, information sharing and offering of suggestions flowed in both directions between the students within pairs and across different pairs working at adjacent positions. This arrangement permitted the flexible use of technology in a classroom setting where limited resources were available.

Teacher Practices and Outcomes

Project-based learning at Newsome Park was explicitly tied to a learning philosophy the staff described as constructivist, which calls for learners to actively engage in collaborative, complex, problem-solving tasks in order to construct their own knowledge and develop higher-order thinking skills. This approach to instruction was fundamentally different from traditional direct instruction, characteristically described as the teacher dispensing all the information students must learn. Teachers at Newsome Park adopted elements of this constructivist teaching method in the past and during the 1999-2000 academic year focused on applying it on a larger scale through their three-phase approach to implementing project-based learning.

In order to enact their vision of constructivism and student-driven, project-based learning teachers posed questions to students, so as to relate the curriculum (project) to students' interests and life experiences and elicit relevant information, especially during the initial planning phase. While students did the fieldwork (second) phase, the teachers frequently circulated among the students, asking them questions, helping them find information, use materials and technology, and determine their next steps. For many of the schools' teachers, this increased the frequency of how often they acted in the role of a coach to the students.

Most teachers at Newsome Park employed heterogeneous grouping to incorporate all students in small group collaboration. Attempts were made to ensure that low performing students played a

significant part in the group's work, particularly when using technology. Teachers at Newsome Park, in general, believed that this pattern of pairing students of different levels benefited all students.

The teachers reported that in the first couple months of the school year they needed to regularly dedicate classroom time to help the students develop the capabilities necessary to support their project work, such as self-monitoring and group process skills, in order to prepare students to effectively work independently and in groups. Because the students loop with the teacher (i.e. continue on as an intact class into the next grade), the teachers see this as worthwhile investment that will aid smooth class functioning.

Technology was used as a tool in a variety of ways to support these projects. In a 2nd grade class in the fieldwork phase of a relatively short and small in scale (about 1 month) project technology was used at different times. For example, after the discussion in which the students identified changes in their community they spent time at the four laptop computers (in triads) situated around the classroom creating an Excel spreadsheet to help them tally the results of a neighborhood survey. The wireless network and laptops added flexibility for the teachers. They could concentrate on the placement and groupings of students that made the most sense for the learning, not those required by hardware placement.

As students work on projects, the teachers regularly provided guidance and feedback on students' organization of their ideas and completion of the tasks. In their groups, students contributed to this process by answering questions, asking additional questions, giving advice to each other, and offering suggestions and recommendations about the projects.

The teachers in Newsome Park regularly modeled how technology could be used in completing projects. Because all teachers have laptop computers available to them, many use a variety of software applications and multimedia programs to present materials or to models activities to students. In a 4th grade classroom we observed, the teacher began the class by giving a multimedia presentation about fractions (1/2, 1/4, etc.) that showed squares being divided into halves and into fourths. As she presented this lesson, students watched while sitting in pairs. The next day, the students worked at laptop computers around the classroom, using the same multimedia software the teacher used the day before to create slides of whole squares representing fractions. The math concepts presented were to help the students better grasp some of the mathematical calculations they would encounter in using spreadsheets.

Teachers at the school felt that the project-based learning approach required a theoretical understanding of the approach and knowledge of how to best implement it. Teachers reported that project-based learning had changed or reinforced how they think about student learning and their assumptions about the purpose of education. It had also changed how they viewed the role of technology in the teaching and learning process.

Collaboration also occurs among teachers at Newsome Park. Teachers work in teams within the same grade level on a regular basis. Usually two teachers divide different content areas in their classes (e.g. one teacher teaches science and math; the other teaches language arts and social

studies). Or a group of teachers within a grade level will focus on teaching a specific subject to all the classes in a grade level.

Student Practices and Outcomes

With project-based learning at Newsome Park there was an expectation that students will play an active role in learning and contribute to this process. Students generated ideas to help define the projects; additionally, students worked collaboratively with one another in order to complete their project. As needed, students provided solicited or unsolicited assistance to their assigned partners or small groups.

The schoolwide adoption of project-based learning created new and expanded responsibilities for students that had not existed before. Students took on different roles as they collaborated on different aspects of the projects. Students volunteered for or were assigned different responsibilities on their project teams, depending on the nature of the project and number of functions that needed to be performed. At the end of each of the three phases of problem based learning the class of students created a project storyboard that was displayed for others to see during a celebration of learning day. Throughout the course of a project, students either performed specialized tasks on their project committees or rotated, performing different functions on different committees. In a 3rd grade project on light rail systems, for example, students rotated between different tasks given to a map committee, a research committee, and a field trip committee. In a 4th grade flowers and plants project, students performed specialized tasks throughout the project—collecting survey data on the preferences of potential customers, cultivating the plants, developing and implementing an advertising campaign for the plant sale, or conducting Internet research on how to care for the different plant varieties.

Educational technology aided students to complete steps of the project by supporting their accessing data, processing information, and communicating what they have learned. In the fourth grade class project on flowers and plants, students used spreadsheets to tabulate survey responses collected from the community on their preferences for flowers, including types, colors, and habitat. This information was used later to help the students manage different aspects of their plant "business". Each student in class also used spreadsheets to record regular measurements of the plants being cultivated at the school, to place them into categories, and to systematically monitor the growth of their own plants. One student described how spreadsheets were used: " Before when we had seeds we got into groups we got into groups and planted them and mixed the soil up and each day we switched plants and we had to do spreadsheets and we had to say, what is the average height, what they looked like, what is the date, how many days will they come up." Students in this class also used technology to collect information on the Internet on how to care for the growing plants.

In addition to technology aiding students in completing steps of the project by supporting their accessing data, processing information, and communicating what they have learned, it allowed them to meet the SOLs on technology. Students were taught technology skills directly by the technology resource teacher, who tried to coordinate this instruction so it provided the students with the necessary skills for the projects underway in class.

The use of project-based learning and technology at Newsome Park contributed to improvement in a range of student competencies. Teachers and administrators reported improved oral communication skills, increased ability to work in teams, increased technology proficiency, and a deeper understanding of the content and process of learning. Additional outcomes that teachers reported include: increased engagement and participation in class, greater sense of community, and greater involvement in community service. Confirming teacher reports, we observed a wide range of project presentations that demonstrated the communication skills of the students. Additionally, Newsome Park made significant gains on state Standards of Learning examinations during the 1999-2000 and 2000-20001 school years, indicating that the adoption of project-based learning may have played a role in improving student outcomes over the last two years.

In addition, project-based learning appears to have a connection to improved student attitudes toward learning, as reported by both teachers and students. Teachers also reported that student motivation increased with the use of project-based learning. Teachers in the teacher focus group reported that students exhibited increased engagement in the class. Students also reported that project-based learning made learning fun and more consequential.

Lessons for the future

Noteworthy Outcomes

There was general agreement among teachers at Newsome Park about project-based learning and its benefits. When asked, teachers at Newsome Park said that their common philosophy was an important driving force behind their willingness to put in the extra time required to make project-based learning work. Many of them explained that they were so pleased to be doing something that they had previously not been able to implement in such a complete and successful manner.

All teachers at this school successfully completed the technology professional development (FutureKids) training. And all teachers participated in the use of projects by the end of the second year of their use. As of our visit, the school staff was continuing to refine their approach to project based learning and prepare new teachers on their staff to implement projects.

Student's enthusiasm for their learning was high. The staff described students' interests in what they were learning as exceeding what they have previously experienced. The staff attributed this enthusiasm to the students' providing direction to the project at each step of its evolution. Parents too were pleased about their students' enthusiasm for what they were learning; this magnet school had a waiting list of parents who wanted to send their child to the school.

In addition to these other outcomes, during 1999-2000, and 2000-2001 the school's overall percent of students achieving the Virginia's Standards of Learning (SOLs) rose.

Added Value from Technology

The rise in the use of technology that accompanied the switch to tool software and Internet resources away from courseware illustrated that in order to be used and add value technology

resources must "fit" the instructional approach. This software and laptop, wirelessly networked hardware provided flexible tools that could adapt to the project-based learning topics and groupings that worked best for the projects.

Key implementation factors

It appeared that one of the chief reasons project-based learning was being sustained and embedded within the broader teaching culture at Newsome Park is that teachers shared in the leadership of the reform and drove its implementation. Its adoption is a schoolwide effort with the support of the majority of teachers and administrators in the school. Project-based learning supported by technology was something that the staff had always been working toward, not a practice that they had recently adopted. It is likely that teachers in another school setting without a history of implementing new practices would not be willing to deliver the efforts necessary for carrying out project-based learning.

The demands of project-based learning required a flexible technology infrastructure and a robust operating platform. At Newsome Park, the selection of the wireless network, the portable laptop computers, and the integrated software applications provided the needed flexibility and the power that could support the adopted innovation. Any attempt to implement project-based learning at another site will require coordination and a clear vision for how the technology will be used to ensure that it is appropriate for project-based learning.

The sustainability of project-based learning at Newsome Park was also tied to the mixture of funding mechanisms that supported its implementation. The Comprehensive School Reform Demonstration grant from the U.S. DOE, administered by the CTAC committee, provided $50,000 per year over three years, which funded a range of activities that supported the school's adoption of project-based learning. Having a flexible source of funding like this allowed Newsome Park to provide a rich environment to support the adopted innovation. For example, even though the school's teachers already had a background or training in the instructional aspects of the innovation, the school leaders sought out conferences for teachers to attend and hosted the professional development on-site at Newsome Park. The principal acknowledged the "boost" this grant provided but explained how he would have searched out money for the same offerings through other district resources had the grant not been awarded to them. Whether through external grant funds or local operating funds, the funding of staff training in the use of technology for instruction is of paramount importance in implementing project-based learning with technology.

Additional school-level policies and practices contributed to the institutionalization of the innovation. Looping allowed teachers to get to know their students better and build a collaborative community, essential elements that support project-based learning. The professional culture is also strengthened and enhanced by the professional development offerings available to teachers. The State's Standards of Learning (SOLs) have also played a key role in how Newsome Park has aligned the innovation to state policies.

Challenges

While the school staff was remarkably cohesive in their teaching philosophy and their commitment to implementing project based learning, a number of problems emerged during the first year of implementing the innovation. The additional work that project-based learning demanded created tensions for the teaching staff initially. According to one teacher, one of the reasons for the tension was, "...the time factor. At the beginning of the school year- we were really overwhelmed." During an external evaluation completed at the beginning of the 1999-2000 school year, a number of teachers expressed concern about the extra burdens they had to carry in implementing the CTAC plan. In the middle of the school year, teachers made the transition from using a Windows-based platform to using the wireless Apple laptops. This required additional time for them to master a new operating system and several software applications. In time, however, the majority of teachers adjusted to the changes and supported the CTAC's plan. The decision by the CTAC team to present implementing the innovation voluntarily resulted in a majority of teachers committing themselves to participate. As one teacher put it, "We're here because we all buy into it so I think we all have ownership." During 2000-2001, the school year following our visit, 100% of the teachers participated.

While the technology resources at Newsome Park appear to be adequate in supporting project-based learning, there is not one laptop for every student. Additional laptops can be checked out from the computer lab or borrowed from other teachers' classrooms, as available. Even then, students were often paired up with a computer to conduct research related to their projects. This additional coordination and scheduling of equipment could inhibit some teachers' use of technology in the classroom.