Emerson High School
Case Report from the
U.S.A. Exemplary Technology-Supported Schooling Case Studies Project

Emerson High School: Whole Language Curricular Reform with a Technology Focus

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Emerson High School: Whole Language Curricular Reform with a Technology Focus

Case Overview

Emerson High School was a 9-12 high school located in one of the most densely populated municipalities in New Jersey. During the 2000-2001 school year, the school's enrollment was more than 1250 students, 88% received free or reduced-price lunch. About 95% of students were Latino; nearly 70% spoke Spanish as a first language at home. Over two third of the district's teachers were certified to teach English as a second language (ESL) and one-third taught in bilingual/ESL programs.

The innovation at this school was the integration of technology (both regular desktop machines and thin clients, which are network PCs lacking local diskette or CD-ROM storage devices) as a part of a whole language curricular reform. The label "whole language" was used in a broad sense in this district. In essence, the educational philosophy of whole language encouraged teachers to develop their own curricula and to involve their students as active participants in their own learning. This philosophy guided teachers in their lesson planning and instructional strategies. Involving students as active participants led to project-based and cooperative group work. The technology, particularly the thin client servers, provided a common environment in which to develop, store, and implement lessons. Internet access allowed students to more easily research topics of interest to them; computer tools allowed them to more easily complete project work. The thin client environment also facilitated students' individual and groups project work by providing shared server space that can be accessed from any Internet-connected computer.

The district began their reform efforts nearly ten years ago to avoid a state take-over due to low test scores. Test scores as well as other school performance indicators (such as attendance) have gone up as Emerson students were pushed by faculty and staff to excel academically. College preparation was a significant role that the school had undertaken and the graduates' success stories seemed to encourage more students to aspire toward higher education. Given the community's low socio-economic status, the steady and growing number of graduates heading to top colleges and universities is impressive.

Implementation Context

History of Innovation

The systemic reform in this district began more than a decade before our site visit. The curricular reforms that took place at Emerson High School started as part of the district-wide effort to improve lagging educational indicators. The reforms were first implemented in the primary grades and advanced year by year to the high school. It was in the 1995-1996 school year that Emerson High School first enrolled ninth graders who had been part of the district-wide reforms that began in the elementary grades years before.

In 1989 the district was placed on probation by the state because of poor performance on indicators such as standardized test scores and student attendance. The state imposed a five-year window to improve the failing school system, which was ranked in the state as the second worst performing, and also one of the poorest. At the same time, a state law was passed to address funding inequities between rich and poor districts. This resulted in an immediate and large funding increase to the district, which then incrementally increased until the district was on par in per pupil spending with the wealthiest group of New Jersey districts. During the first years, much of this was put toward repairing leaking roofs and other worn down facilities. But in the first year alone it also produced a nearly $1M boost to the curriculum resources budget.

Another important contextual factor in the history of the improvement effort in this district is that most of its students were bilingual; additionally, many were recent immigrants from Spanish-speaking countries and varied widely in the amount of formal education they had received to date. So that teachers were prepared to these help bilingual students learn, over the years the school district encouraged and provided incentives for teachers to gain an ESL certification. At the time of our site visit, nearly 85% of the Union City district's teachers were bilingual, ESL-certified, or both. Out of necessity, these teachers used instructional approaches that relied less on textbooks, adapted assignments to take advantage of students' prior knowledge, and included active learning experiences to engage students.

Along with making repairs to the run-down facilities, and investing additional resources into instructional materials, district leaders decided to take advantage of the base of ESL teachers and implemented wide-scale instructional reforms as a part of their improvement efforts. Using an incremental approach by grade level, beginning with a five-year plan focused on primary students, they implemented instructional and curriculum reforms they referred to as a whole language approach to teaching. It meant using more primary source materials instead of relying strictly on the textbook and employing more active, student-centered approaches to learning. The district's high school English language arts curriculum guide in part defined whole language in terms of the students' experience while learning:

> …whole language is about all learners feeling whole and able and part of a community of learners. It is about belonging and risk taking and feeling successful as teachers and learners. It is about the power of collaboration to break down the isolation of teachers to establish communities of belonging and learning for all students and teachers. (District web site.)

Within a few years' time, in the school district's primary grades the improvement efforts began to reap improvements on student achievement indicators. As a result, many parents who had placed their children in a local Catholic school opted to make use of the public school system. Since the Catholic school enrollment numbers dropped drastically, the Archdiocese decided to close the school and sell the building. Because the public school enrollments had risen, the board of education decided to buy the building and turn it into a grades 7 and 8 middle school.

About the same time the district was going to modernize the school to meet state codes, the Bell Atlantic telecommunications company was looking for a test site for its new ISDN data/phone lines. They wanted to choose an urban school district in New Jersey, but they had some limitations. The ISDN hub could only work within a square mile, so the school district had to be

geographically very small. Union City school district was about that size, and was approached by Bell Atlantic, and agreed to participate. To implement ISDN, the company needed the state to relax some regulations. As a stipulation to doing so, the state demanded that they give some money to support urban schools. This led to an arrangement where Bell Atlantic came into the middle school building the district was already refurbishing and wired all the classrooms and provided each with several computers. Bell Atlantic also initiated Project Explore, an experiment where they provided all 130 seventh graders and 20 teachers at Columbus Middle School with a home desktop computer and Internet service.

Students who had been a part of the reform movement since third grade reached the eighth grade in the 1994-1995 school year. When they took the state tests, the passing rate jumped from 22% to 62%. The Columbus Middle School's Project Explore students performed about 10% higher than district peers at other middle schools, who did not have the same level of access to technology in their school and at home. This success, the Project Explore students' excitement about the technology, and the fact that the technology complemented whole language instructional approaches reinforced the district leaders' confidence that their approach, including the technology, was working.

The students from modernized and technologically outfitted Columbus Middle School went on to Emerson High School. When these students moved to ninth grade, in the 1995-1996 school year, whole language and technology adoption arrived at Emerson High School as well. The curriculum director had continued with a one year at time approach, and provided incentives that encouraged about ten of the ninth grade teachers to participate in the reform. The incentives included getting to use the same room all day, having that room refurbished with new carpeting and ceilings and furniture, getting a group of four to five computers in the classroom, and a small budget to purchase classroom curricular materials. Bell Atlantic wired these classrooms as well. Additional teachers were recruited for the next year in grade 10 and so on. The increasing cadre of teachers, combined with pressure from the students, who had only ever known a whole language and technology-rich schooling experience, helped to spread and sustain the instructional improvement efforts at this school and throughout the school district.

School Culture, Professional Community

A striking feature of the school's faculty was their common understanding of the school's mission and purpose. We were surprised that there was a widespread acceptance of whole language reform and technology use, particularly when the school staff had not undergone a complete transfer, as with the opening of a new school. The large ESL-certified teacher workforce that already embraced some of the pedagogical practices of whole language reform explained this in part. However, a good part of the credit was due to the formal and informal professional development in the school and district.

The close sense of community, especially for an urban district, was also noteworthy and may have contributed to the informal professional development that provides guidance and advice to newer teachers. Frank Scarafile, the school principal, related to us how he was a graduate of Emerson High School and that some of the teachers we interviewed had been at the school for

most of their careers. Newcomers were acculturated into the school through both formal and informal methods:

> I graduated from here in 1977 – I would have to say, over 65% of the teachers back then were Union City graduates…. That trend has changed dramatically now, so a lot of the teachers that come in really don't know Union City that well. So there is more of a period of adaptation for them. And the faculty is pretty good at bringing them in and taking them under their wing. We have a good system of mentoring new teachers here. There is a lot of interaction between departments, especially within your department; you definitely get a lot of help there.

Based upon lessons learned in the early years of the restructuring, and especially during the massive retraining of the staff in the whole language philosophy of literacy acquisition (from 1989-1993), the school district developed a five-stage model that supported teachers in becoming truly proficient in using new pedagogy. Emerson now uses this model and has integrated technology into the daily curriculum with the support of the National Science Foundation, and a host of local and state funding sources.

Technology and Technology Support Structure

Emerson High School is now the most technologically advanced school in the Union City school district. At the beginning of the 2000-2001 school year, there were 509 computers, of which 461 were used for instruction. Emerson's computers were distributed in labs, the library media center, and in clusters in the majority of classrooms.

The local area network was installed starting in 1996 and became fully operational by 1997. A T-1 wiring infrastructure was put into all eleven public schools, two public libraries, and the City Hall. All classrooms were connected to the T-1 lines via fiber-optic backbones in each school, which provided students, staff, and community members at these locations access to the district's Union City Intranet and the Internet. In addition, students, teachers, and administrators were provided with password-protected access to these same resources from home via a high speed DSL connection.

A thin client terminal-and-server approach was implemented at Emerson and one other district school in 1999. The district contracted with ClassLink Technologies to set up the software, servers, desktop interface, and user accounts. Emerson High School began with 80 thin client terminals in English and social studies classrooms. During the 2000–2001 school year, the system expanded to nearly 230 seats, and now includes all math and science classrooms. A thin client system offers many technical advantages. For example, any software need only be installed once on the thin client server; this saves time over technicians servicing each computer. It also protects against software being deleted, either by accidents or through mischievous behavior. All users' files were also stored on these networked servers. The software and data files were accessed by teachers and students via the thin client terminals. Because the thin client server is connected to the Internet, students and teachers accessed their own folders or work and email accounts via password-protected access from any web-connected computer.

To support home access to students' schoolwork and e-mail accounts, the Union City School Board provided free Internet service to all students' homes; parents were still responsible for a phone line connection into the home. This extended the hours during which students could access the software and their schoolwork and also allowed students and their parents access to grade information, e-mail and the Internet.

Emerson High School also had the Project Bulldog program, which took after the Project Explore program at Columbus Middle School. Project Bulldog offered students who did not have a home computer the opportunity to apply and receive a Windows platform desktop computer and printer to take home on loan for the school year. Some students were randomly selected to participate and others were selected based on a number of criteria such as honors student designation, need and previous participation in Project Explore. At the time of our visit, the project was in its second year; during each year it had offered this opportunity to 50-60 incoming freshman. The principal indicated that they planned to expand Project Bulldog by approximately 70 participants in the year following our site visit.

All teachers used thin clients for administrative purposes because the thin client server was the only way to access grades and carry out internal correspondence such as e-mail. But according to a school technology specialist, perhaps only half of all teachers at Emerson used the thin client system for instructional purposes. A quick perusal of the teachers' individual directories or folders bore this out. Some teachers had no files in their folders. Teachers that frequently used the thin client had multiple branched directories with numerous files of student work or student projects.

Software on Emerson's computers included the Microsoft Office applications. Some computers also included programs such as Adobe Photoshop and other specialized software used in particular classes, such as the Computer Applications classes.

Technology support derived from many different sources, including the school district, school faculty and staff, and students. The Peer Coach at the school, Marjorie Zacagna, provided formal instructional support. She worked closely with teachers to support their instruction with technology and whole language methodologies. She explained that, through her full-time position, housed in the school, she offered non-evaluative support:

> I work with new teachers, helping them with the technology and the various whole language, cooperative learning. And the first year, the first two years maybe, the seasoned teachers were very hesitant about coming to me and asking me anything. Now they're not hesitant at all, because I do not evaluate. I support. And that is a key. Because I know that when we researched peer coaching, we went to a lot of areas where peer coaches were evaluators, and they actually have a say in whether or not someone would be hired, or a contract would be renewed. And when I sit down with a teacher, I'm telling the teacher that I'm there to assist them with all their problems. If they think that I'm going to evaluate them, they're not going to tell me what their problems are.

The staff we interviewed insisted that the introduction of new instructional practices using technology was never forced upon them or, to their knowledge, upon others. Rather, the administration offered incentives and used a few teachers as examples in order to stir interest

among the rest of the school staff. District administrators used creative titles such as "super rooms" to promote an alternative classroom environment conducive to cooperative grouping, whole language instruction, and integrated technology use. The Peer Coach explained how, at the time, she was an English teacher who was enticed into participating in the improvement efforts through the promise of renovation to and equipment for her classroom:

> The teacher next door to me got a Super Room: He got tables instead of the rows [of desks]--conference tables! He got five computers, and the side of the room became the computer lab. He got a classroom library. He no longer had to bring his class to the library to select books. The books were now there, and he could order whatever he wanted, as long as it fit within the curriculum at the time. And there were books there for occasional reading, there were books there for reading circle groups, there were books there for book reports and projects, and he could order any resource books that he wanted to reinforce….[with] the new furniture and the new floor and the dropped ceiling, his room looked like paradise, and we had rumors of wonderful things happening in there. And we would stop by to see what was going on. And the following year, [the Principal] came to me and asked me if I would be interested, and I said, Absolutely.

The only caveat to teachers receiving a super room was that they learn to use the technology effectively, which many did through training offered by the school district. An additional measure to help the high school teachers learn to use the technology was that the administration also created a mentoring program that paired incoming students with a faculty member. The students that arrived that year had undergone a different education than those before them. Since the third grade, they had been exposed to whole language instruction and the technology to support that instruction. They were already very familiar with cooperative grouping, block scheduling, and using computer and Internet technology.

Context Beyond the School

The state policy mechanisms that identified Union City as a low performing school district jump-started the reform efforts in the district, and provided monetary support and a time frame within which it needed to show some improvement. On June 5, 1990, the state Supreme Court of New Jersey designated 28 of its urban poor districts as eligible for additional state funding to reach parity on per pupil expenditure with more wealthy districts. This represented about a 10% increase, which was used to improve facilities. However, nearly $1M was dedicated to set up or upgrade educational technology hardware and software, increase staff development, and replace textbooks for each student with libraries for each class. By 1996, after a fruitful partnership with Bell Atlantic, the school district was recognized by the U.S. President and Vice President as an exemplary model for reform and technology innovation.

State standards and assessments also guided the teaching and learning at Emerson. In 1992-1993, the State convened panels of educators, business people and other citizens to develop preliminary draft standards in seven academic areas and career education. During 1995, similarly constituted working groups built upon these preliminary standards and engaged the public in a review process that resulted in a total of 85 standards comprised of 1195 indicators. The state education department reviewed the standards proposed for eight content areas and extracted the following five cross-content workplace readiness standards that apply to all areas of instruction.

Improvement in Teaching & Learning

Curriculum and Assessment Aspects of the Improvement

The content of the curriculum as well as the goals for education generally were explicitly declared by the state of New Jersey in these seven academic content areas: Visual and Performing Arts, Comprehensive Health and Physical Education, Language Arts/Literacy, Mathematics, Science, Social Studies, and World Languages. Because the state determined the curriculum, the improvement efforts at Emerson were in terms of the instruction and assessment of the curriculum, as opposed to the curriculum itself.

According to school district literature, whole language reform "is a universally recognized attempt to create meaningful and relevant learning within a rapidly changing world. Whole language is grounded in the recent research on language, learning, and teaching that shows that learning is natural." Cooperative teaching and learning as well as the project work by students (often associated with methods of teaching based upon a constructivist model of learning) are common in this type of reform.

A district administrator commented on the instructional reforms at the school and how they related to the educational reform literature. “And then mid-1990s, we heard about constructivism, we said, hey, this is what we do. But its root [the district’s improvement effort’s origin] was very different. Its root was based on bilingualism, multicultural education. But clearly we’re a constructivist district when we look at it, because we’re proficiency based and we open up to all kinds of sources, and that’s constructivism. Again, it’s not like we sat around and said, let’s be constructivists.” Indeed, during the site visit, none of the teachers to whom we spoke referred to themselves or the reforms as constructivist.

The Peer Coach explained how the whole language approach also influenced the selection and purchase of classroom resources: "Whole language is authentic literature…We were a very textbook-oriented district. We are no longer. When we stopped buying textbooks, which cost $50-$60 a textbook, we then could use that money to buy paperback books in the literature that we were teaching. No longer did we have to go to the textbook for excerpts, we now bought the book."

Emerson High School also changed its schedule and developed mechanisms for teachers to coordinate their instruction. For example, the school faculty's peer coach described how for English and social studies the schedule was “wheeled” so as to support students developing a deeper understanding of subject matter across disciplines:

> …[for] the literature that is being covered in [freshman] English 1, the History of the period is being covered in freshman history class. Since we have “A” day and “B” day, let’s say that the ninth grade English class was block period 1 on A day. Those same students will go to the same teacher in block 1 on B day and learn the history of the literature that they’re learning. Very often the teachers will say to one another: “I have

> this project going, would you mind if I took the class two days in a row, and then you can have them," and the teachers do work together in that way.

Emerson was a part of the Coalition of Essential Schools, and the staff members' participation has lead teachers to actively seek alternative assessment methods. As part of their graduation requirement, students at Columbus Middle School, which feeds students to Emerson, had to put together an exhibition on a specific subject area and defend it. Emerson teachers familiar with that aspect of assessment at the middle school believed that this type of authentic assessment could be implemented at the high school level as well. As one teacher commented, "If they [students] can take the information that they've gathered, they can form a cohesive essay and give an opinion within that essay, that's test enough." During our site visit we observed self-assessment of student work, assessment by the student's classmates, or teachers; we also observed more traditional assessments, such as unscheduled quizzes.

Many of the innovative projects tied into advance placement coordination with colleges or the workplace. Web design instruction as well as the Cisco Academy allowed students to learn a useful skill as well as earn money. Given that many students needed to work to contribute to their families and to prepare for post-secondary options, the prospect of earning money in a sought-after career right out of high school was very appealing.

Teacher Practices and Outcomes

The technology at Emerson High School supported teachers' assigning projects and products for students to complete in collaboration with one another, which in turn allowed teachers to alter their role in the classroom. It also provided additional learning resources and opportunities to students, and helped teachers communicate with students and their families.

As a part of the English language arts curriculum, students studied authors. A common assignment for students was to produce a presentation that demonstrated what they had learned about the authors and their works. In one class, the culminating project for the whole class was to create a website on an author. Other students were asked to make an hour-long presentation using PowerPoint and other tools. The students were expected to make their presentations interactive, and to produce handouts to accompany their presentations. A student in the focus group commented that he/she knew that his/her job was not to just present information, "But it's how creative your presentation is, how you're timed, how your speech coincides with the PowerPoint itself." Another student indicated that her English teacher used technology to allow students to "go online and find pictures of people who, in our mind, look like that character in the book."

In biology classes, students might use technology to access the Internet to look up information, play games, or take quizzes. At the time of our visit, one biology teacher reported that during that month students were investigating two human systems. They used the Internet to locate pictures of the parts of those systems and to learn about their functions, and then reported back, using their own words and illustrating this with images they located.

In social studies classes, students also used the Internet to supplement information in their textbooks. One history teacher reported that he considered the Internet to contain "a tremendous amount of wonderful stuff out there that these kids can learn from." He went on to relate how students were able to find on the Internet information in multiple media formats to enrich their understanding of a particular period of time in history:

> For example, not too long ago I was teaching about the great depression and we were talking about music during the great depression, and we went to a website.… that had not only the songs and lyrics, they had original recordings by people like Bing Crosby, all kinds of people. And they actually listened to the original recordings to these songs. And they did the same thing with [songs from the time period of] the stock market crash….they not only read the lyrics…but they actually listened to the song at the same time. You can't beat that!

Many teachers mentioned the ClassLink system, the thin client user interface the school purchased, as a valuable and necessary component to the ready technology access in the school. Among other things, ClassLink allowed all students and teachers to have their own folder on the server. Students as well as teachers could access this from school and from home. This supported students compiling a portfolio, and provided a way for teachers to comment upon students' works in progress and grade students' completed work. Teachers, through their folders, were able to make assignments and grading criteria available for students to reference.

In addition to using technology to promote students' active engagement with the curriculum, the school adopted cooperative learning strategies. As a result, students were more likely to rely on one another to determine how to proceed with an assignment, to synthesize information, and to communicate what they have learned. The ClassLink system facilitated students sharing and co-developing technology-based products. The cooperative learning, whether involving technology or not, demanded different roles of both the teachers and the students. Many of the administrators and staff we interviewed described how, when students took on more responsibility, it didn't lessen teachers' responsibilities, but shifted them. Peer Coach Marjorie Zacagna described how she thought the role of teachers had changed, and that teachers' responsibilities have greatly increased:

> What we are required to do in a classroom now is much more demanding upon us and our time and our energy. When I teach a cooperative block learning period, at the end of that period I'm exhausted….[maybe] I'm not on in front of them [students], but I'm always on. When you walk into one of these classes, you will see probably two to three different activities going on at the same time. There will be students working in circle groups on a literature project, or a reading circle project. There will be students writing on portfolios at their tables. There'll be students at the computer. The teacher in that room is responsible for everything that's going on. Responsible for where they're going on the computer, responsible for making sure that every student is engaged in whatever the activity that they're supposed to be doing at that time.

In the focus group we conducted with teachers, a social studies teacher offered a similar opinion, and then described the teachers' role as facilitator, instead of a more formal figure that stands always in the front of the classroom, working with the whole class as one large group:

> When you come into a cooperative learning situation, you are the facilitator of the research, you're the facilitator of the gathering of knowledge, where you can sit with a group and interact with them while other kids around the room are doing something else, and you get a much different level. The informality is more conducive to learning, in my estimation.

Some course offerings were possible because of the amount of technology at Emerson High School; for example, the computer technology course. Ela Messeguer taught this class to 16 juniors. When we visited the class, the students were in their second week of designing and building a web site about a topic of their choice. As the students entered the class and sat down, they immediately logged into their thin client account and accessed their work in progress. Messeguer pointed out that these students worked independently and asked for help when they needed it. Messeguer started the class by reviewing a student's webpage and pointing out to the rest of the class some innovative approach that the student had used. She often reviewed the student's work as well as other web sites to challenge students to use new technologies. The student quickly took over, with his computer screen projected to the front of the class. He began his impromptu presentation by showing the other students the animation of gifs on his web page and then looking at the HTML code to embed it.

Through a course called Team Tech, students learned to do computer repairs. The course combined a classroom training part with hands-on experience in fixing machines. The year we visited the school, the number of teams repairing equipment was double that of the year before. These on-site student repair teams reduced technology maintenance costs and students were able to gain practical technical experience. The school's video magazine provided students with opportunities to learn new skills from the photography teachers, including how to edit video with computer graphics programs.

Emerson High School's teachers' work provided students with technology use and learning opportunities beyond the classroom. Ms. Messeguer actively pursued opportunities for students, such as the contest sponsored by Sprint communications to design websites for wireless communication. The winner of the best wireless webpage won a $1500 scholarship. Messeguer led an after school program called Project Smart, where students created webpages for $10 per hour. Messeguer also taught the summer computer training opportunity for students called CAMP (Computer Application Mentoring Program). Seniors with a GPA of 3.75 or higher who wanted to advance their web design skills could attend CAMP. This program received Best Practice designation by the New Jersey State Department of Education.

The technology at Emerson High School also supported additional communication with students and their families. Every member of the faculty and staff participated in a mentoring program and was responsible for getting to know at least a few students and meeting with each on a weekly basis. The principal himself mentored five students and often corresponded with them through e-mail. The principal explained that this program, along with the e-mail access, helped to establish a direct communication line with the home:

> I have my own mentee…I communicate with her weekly, [by] e-mail, if she has any questions, concerns, she e-mails me back….So she'll come to me for any advice, any

> help, and we go from there. But it works out well because you do have that one-on-one contact, that link to the school. The parents have the link to the school.

E-mail also allowed teachers, students, and their families to correspond with one another outside of regular classroom hours. English teacher Lynn Russ explained how technology has provided a means for more immediate communication about students' assignments and performance:

> Now that we have technology, the kids can always ask you a question. They e-mail you a question at night. The kids know I'm on at a certain time, or over the weekend they can e-mail me. If they're going to be absent they can e-mail me their assignments so they're not late. So that immediacy is there. I've had a parent e-mail me, I'm sorry my son hasn't blah blah blah--whatever their message happened to be.

Biology teacher Anna Lanzaro also discussed how students are able to submit their homework electronically through e-mail and, through a class website, they could also review their assignments.

Student Practices and Outcomes

Overall, Emerson students arrived their freshmen year with expectations about the technology available to them. They expected to be able to conduct research online and to have classrooms with more than a dozen computers. At Emerson High School, the whole language perspective promoted reading of primary source documents and shifted the analysis from the textbook conclusions to self-determined student comprehension. The sequence of learning was not tied to the table of contents in the textbook. When conducting research on the Internet, students were taught to carefully assess the authenticity or validity of what they read. The use of computers in the classroom and the reliance on primary sources instead of textbooks allowed students to work independently, or in groups. Students made presentations, critiqued each other's work and learned from each other.

Once in the high school, students from the reformed feeder schools were very knowledgeable of computer hardware and software and, in many cases, were more knowledgeable than their teachers. The mentoring program paired technology-proficient students with faculty who had just gotten super rooms. Students helped teachers with technology support and problems surrounding technology and this also became a natural bridge for informal discussion between students and teachers. The Peer Coach explained that teachers learned from the students:

> I thought, and I underline that, I thought I was ready for them. But no one could have been ready for them. I mean, they knew it all, and they taught most of what I know, I learned from them. We realized that using the students to teach the teachers was a wonderful idea, because we wanted to build into the program this mentoring component, and when my mentee taught me, it kind of solidified our relationship.

Student expectations also helped to change teacher perspectives. At the feeder schools, students were exposed to cooperative group learning, thin client technology, and a block schedule. They had similar expectations for their high school experience.

The principal estimated that about one-third of Emerson's students had computers in the home. The school's computer labs were available for student use after school. While the district provided Internet service to homes, using it was dependent upon having a computer. Project Bulldog bridged this access gap for a limited number of students. In addition to the computer and printer, students and their parents receive e-mail accounts in order to facilitate communication between the home and the school. Each Project Bulldog participant was also required to attend a monthly meeting, have good attendance, and keep his or her grades up to a specified level. The participants were each mentored by a staff member, who helped them not just with computer issues, but with all sorts of issues related to school success.

In general, students received the most advanced computing opportunities in the Computer Applications class. Students in this course usually had an interest in computers already and designed the school's and district's web pages. The Computer Applications class showcased a variety of sophisticated and creative student projects. When we visited the class, students were completing the design and functions of their project website. One pair of students commented, "We're doing different things. I'm working on the HTML, and he's working on graphics in Adobe Photoshop." Emerson also housed a Cisco Academy for training students to set up and troubleshoot routers and offered a variety of vocational courses, such as computer-aided design (CAD) and architecture.

Students who took technology courses, such as the Computer Applications class or the Cisco Networking Academy, occasionally were given opportunities to work on the school's own network. The technology coordinator commented, "We have not had students troubleshoot many network problems and have saved a great deal from the usual outside contractor."

At the time of our visit, which was during Spring, 2001, the New Jersey state graduation test was the High School Proficiency Test (HSPT). It was a criterion-referenced test, and included multiple-choice, short- and extended-response, and open- ended items. All grade 11 students in the state were tested and all students saw the same items. The pass rates for Emerson High School's students were at 70% for reading, 75% for mathematics, and 86% for writing. These scores were about two percentage points lower than the district average and close to the state average as well.

The year of our visit, the school's attendance rate was slightly higher than the state average, while its mobility rate (the percentage of students who entered or left the school during the year) was nearly 25%--more than twice as high as the state average. Emerson High School's dropout rate was substantially lower than the state average, as were the number of student suspensions.

In a focus group, teachers reported many anecdotes about ways they saw technology contributing to positive student outcomes. For example, a humanities teacher described how she thought average- and lower-ability students, in particular, benefited from the technology-rich learning environment:

> I find the average students doing better because of the technology….It empowers them….The average student suddenly becomes a doer, not just a sponge; not just sitting there and accepting and possibly not learning, but all of the sudden now they are in control of the learning experience, and it lifts them up….And I even find a lot of very,

> very low kids, they get a lot of self-esteem, because they can do it. Sometimes you get the kid who may be the lowest average in the class, but he's really technically savvy. All of a sudden, he becomes the person everybody wants in their group. And they have a project to do, and he's right there in the middle, and suddenly you see this kid blossom, because all the kids are looking at him. He's not the football star, he's not the best looking, and all [of] the sudden everybody wants him on their team.

The principal indicated that Emerson has had cause to celebrate in the last couple of years because a greater number of students were applying to and entering higher education institutions.

> A lot of kids are getting accepted to colleges and they're getting into better and better colleges. We're starting to get more blue chip colleges under our belts. I'm very proud of that, and I think that has to do with technology.…You'll see more and more we're getting accepted to better colleges, we're in the Ivy League, and every year there's more and more who get in there. Even the local colleges whose standards have definitely tightened, we're getting more and more in there, so we're real happy with all of that.

Staff we interviewed indicated that when graduates returned to their hometown as college students and visited high school, they in effect delivered a positive message for younger students and bolstered the pride and self-esteem of the community as a whole.

Lessons for the Future

Noteworthy Outcomes

The instructional innovations at Emerson High School created different roles for teachers and students. Students' roles shifted with the expectation that they act as investigators and researchers of knowledge. Teachers who used cooperating-learning strategies with their students acted more as facilitators of student group's work, as opposed to standing in front of the classroom and working with the whole class at the same time.

School-to-home communication was boosted through e-mail. The access to technology also allowed the school to offer technology-oriented classes and to provide opportunities to students to which they would not otherwise have had access.

Value Added by Technology

Students and teachers accessed information online that they would not otherwise have available to them. This helped students learn that there are a variety of perspectives, and those with different education or language backgrounds were supporting in proceeding at their own pace and level of difficulty. As part of the whole language reforms, the high school ceased to follow a single textbook to lead classroom instruction; instead, teachers supplemented textbooks with classroom-based resource books and primary source material. The Internet was usually tapped for authentic documents and references, but with great care to verify the accuracy of the content.

All teachers at Emerson High School used the thin client technology to record and access student grades and attendance records. All teachers and students were provided with e-mail accounts and storage folders on the thin client servers at the beginning of the year. Those who used them regularly for work found it very convenient to be able to access their files from any computer on the school network or through the Internet from home.

Key Implementation Factors

A number of special circumstances helped the innovations undertaken at Emerson to succeed. First, the state's legislative actions allowed this very poor district to receive additional funding so as to level the playing field with the wealthier school districts. Executive Director for Academic Programs Fred Carrigg explained how the funding led to some student achievement gains:

> The truth is none of this had anything to do with technology, none of it. This was about saving an urban school system that was collapsing and going down. And it was about teacher reform and instructional reform and switching to a student-centered education. [and]…It has everything to do with funding….I was very lucky that that money became available, and I have a great superintendent. Our scores in kindergarten, first and second grade doubled in a year.… things were so bad here that, when it stopped raining in the classroom, when they had tables, when they had books and materials, the impact was just tremendous overnight.

Carrigg went on to explain that this success provided some important momentum and support for planning and implementing some district-wide reforms. Another important factor that contributed to the implementation success was the tremendous infusion of technology infrastructure, equipment and, software that began with the serendipitous partnership with Bell Atlantic.

Carrigg noted that other Abbott districts, twenty-five New Jersey school districts of economic make-up similar to Union City's who also received the additional moneys from the state, had not brought their test scores as near to state averages as has Union City, adding that it was money *and* education planning *and technology* that produced his district's results:

> So, it [our success] really has much more to do with all the changes that are taking place, and technology is a very, very important component, but it is one of several. And I firmly believe that alone, it would have made no difference. None. It is coupled with all the other reforms, because I've seen neighboring Abbott districts spend $100 million on technology where we spend three, and their scores go down. But they don't have a reform curriculum; they don't have a student-centered curriculum. They don't have what you observed, the cooperative groups and the project-based orientation and kids owning what they do. I mean, I think that's really the heart of it. The technology makes it possible. It's a tool; it makes up for inequity of access in materials. There's so many things about technology that's all that….It really is a critical catalyst here. But it's not the sole cause.

The demographic context also contributed to the substantial ESL-certified teacher base. Whole language reform may not have worked if Emerson's teachers did not have this background preparation.

Challenges

Transience of the Emerson student population presented a significant challenge to teachers and administrators. According to the school principal, the mobility rate ranged between 20% and 30% during a school year.

As expected, setup problems had to be resolved when the thin client was first installed and troubleshooting is an on-going need. For the most part, students and teachers can resolve most technical troubleshooting, but, on occasion, the school district network engineers will need to be called upon to resolve larger ICT problems.

While not all teachers at Emerson were convinced that whole language reform supported by technology was the best approach to teaching, certainly the majority were generally in favor of the improvement efforts. At this point, supporters of the efforts estimated that it is very unlikely that the innovations at Emerson will go away. The leadership was fully supportive, national recognition has been bestowed upon the school district, students from feeder schools expected this type of instruction, and teachers saw the value of the innovations. A district administrator commented on the sustainability of the innovations.

> It's nice to have administrative support [for a reform], but this is built from the ground up. The teachers understand the philosophy; the teachers understand the goals. So sustainability is built around the faculty. Sustainability is built around the students. None of these kids remember the old way [of being taught]. They even come in and talk about seeing pictures and movies where kids are taught in rows, and they ask us, "Are people actually taught that way?"… And then there's nothing, nothing more important in sustaining all of this than being the number one city in state test scores. Because, no matter what you say--you like it, you don't--it's working here.