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

Jennings Junior High School: Implementing Inquiry-based Teaching with Technology

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IEA's *Second International study of Technology in Education* (SITES) consists of three modules. SITES Module 2 (M2) is an international qualitative study of innovative pedagogical practices that use information and communication technology (ICT). The final project report and cases from participating countries can be found at http://www.sitesm2.org/	The OECD case studies project, *ICT and the Quality of Learning*, is a major international initiative organised by the Center for Educational Research and Innovation (CERI) within its work on Schooling for Tomorrow. This initiative is concerned with the profound implications that ICT has for education and learning and involves many of the 30 OECD member countries. The final project report and cases from participating countries can be accessed at http://iol3.uibk.ac.at/ICTandSchooling/caseStudies/

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Jennings Junior High School: Implementing Inquiry-based Teaching with Technology

Case Overview

Jennings Junior High is a school where all the science and social studies teachers are skillfully integrating Internet resources in support of inquiry-based instruction. The Internet is correlated to the curriculum and is used as a resource; students use tool software to make products that organize their work and express what they have learned. All the students at Jennings Junior High participate in the innovation through these two subject areas. Within the next two years the English teachers will receive advanced technology classrooms as well.

Students have positive attitudes about their learning, improved attendance, discipline and group skills, and have increased their state test scores at a rate faster than their peers in the state. Teachers are positive about the significant changes they have made in instruction and assessment.

Many of the students in the schools of this first tier suburb of St. Louis come from low-income families; approximately 85% of the school's students receive free or reduced-cost lunch. The 500 students in grades seven and eight at Jennings Junior High, the only junior high school in the district, are 95% African American.

This district has made technology a priority, and paid for wiring, advanced technology classrooms, and extensive staff training and support by reallocating funds and applying for e-rate funds. Their goal is to integrate technology to raise student achievement by using technology to support inquiry-based instruction in grades three to six, in social studies, science, and English in grades seven to twelve, and adding mathematics at the high school level.

Implementation Context

History of the Innovation

Inquiry-based instruction supported by technology began in 1994 when the current superintendent first arrived and set a goal for using technology to improve achievement. Since then, the district leaders have directed resources to support improvements in teaching and learning, including re-allocating substantial dollars to provide ICT and support.
The district began their technology and curriculum integration reform with pilots in two elementary classrooms (at grade five and six). Two teachers were selected to complete extensive professional development training through a statewide technology initiative, the Multimedia Interactive Networked Technologies, or MINTs. MINTs was funded by a $2.7 million grant from Southwestern Bell. In six school districts in St. Louis County thirteen classrooms were set up with high capacity bandwidth (10-Mbps connections that could be increased incrementally up to 145Mbps). The networked teachers' workstations had the capability to project work on an electronic interactive white board via a multimedia projector. The MINTs classrooms were also

provided with 15 networked workstations for students' use. And in each classroom a scanner, a printer, a digital camera and quality desktop video equipment were provided for teacher and student use.

The objectives of the original MINTs program (since re-named eMINTs) were to prepare teachers to integrate technology into their curriculum and instruction, provide a high-speed Internet connection, eliminate technology barriers, and bring about improvement in teaching and learning. The two Jennings School District teachers who completed the MINTs training were very successful in transferring their technology training into the classroom. They expanded and enriched their instructional practices through an integrated use of the Internet into the curriculum, and their students showed overall improvement in academic performance. Superintendent Stewart was pleased enough with what he saw that decided to dedicate district resources in order to fund training and "advanced technology classrooms" for six additional teachers in the district:

> We saw from there it was doing the kinds of things we thought would happen. It would improve student performance, change teaching styles and strategies, improve attendance, improve behavior of kids---[now] they wanted to be there. It improved teacher attitude and morale….And from there we decided we would expand after looking at test data also. We expanded into 18 classrooms, which actually last year was the first year for 18 classrooms. We saw the same kinds of initial improvements, and then we expanded again this year to 30. We're training for next year to go into probably 45 or so.

The district planned the technology purchases and professional development so that it more or less replicated the experience that the two teachers in the pilot study had.

The technology integration and implementation that is underway originates at the district level. Its long-term goal is to implement advanced technology classrooms and inquiry based instruction beginning at grade three and extend it through all core subjects (social studies, science, English and mathematics) at the secondary level (grades seven to twelve). They are reallocating a substantial amount of district funds for wiring, hardware, software, staff training and support in order to carry this out, as well as applying for e-rate funds from the federal government.

School Culture, Professional Community

At the time of our visit, all six of the science and social studies teachers at Jennings Junior had advanced technology classrooms, so all the school's students were involved in the innovation during part of their school day. The district plans that within the next two years, at the secondary schools English will also be taught in advanced technology classrooms. Thus, at Jennings Junior the majority of the school's teachers had not received the professional development or the advanced technology classrooms. While we visited only Jennings Junior High School, the technology staff told us that the district's planned expansion meant that much of what we saw taking place there was also happening in an additional twenty-four selected classrooms at other schools in the district. So, while it was not a school wide shared vision for instruction, in the district there was a network of teachers who participated and collaborated about inquiry-based instruction supported by technology.

In most cases, by design, participating teachers had at least one peer in their school with an advanced technology classroom. The teachers we spoke with at Jennings Junior High indicated that the other trained teachers at their school were important sources of support and collaboration.
During our visit, the school had an interim principal. He was positive of the technology efforts at the school, but was not directly involved in helping to make them happen. This effort emanated from the Superintendent's office and the district's technology staff members were the key leaders behind its implementation.

Technology and Technology Support Structure

The hardware in an advanced technology classroom consisted of 15 networked student stations with Internet access; this results in a 2:1 student-to-computer ratio. The classroom had long rows of tables with the CPUs mounted underneath the table surface and a flat screen monitor on top of it. Students pulled chairs up to the tables, and were seated two to a monitor.

The advanced technology classrooms also include a networked teacher workstation, a video projector, a classroom printer, a scanner, and a TV monitor and VCR. It also contained a SMART board, an interactive electronic white board. Through the video projector the computer's screen is projected onto the board; touching the board is just like clicking the mouse on the computer.

Teachers and students have a variety of tool software on their workstations, including Microsoft Office 2000. They use Word to create and print documents, PowerPoint to present information, and Excel to create tables and graphs. Publisher is used to publish newsletters, brochures, and signs. Netscape and Internet Explorer are used to research a multitude of topics.
The Jennings District Technology Director recognized that technical and instructional support was essential to the success of the teachers' integration work and made a commitment to provide high quality technology support through his department: "There are two things that [must] go on. The teachers have to be ready for this, and the technology has to be ready. If either one of those pieces fail the thing falls apart."

Five staff members provide the district's technology support. Three attend to hardware and software problems. The other two are classroom teachers who piloted the original advanced technology classrooms and are now on special assignment as Technology Integration Specialists. They provide the initial curriculum-focused technology training to all teachers and the on-going support for technology integration.

Technology Integration Specialist Cindy Kicielinski described that the first part of their year-long professional development program emphasizes the operation of hardware and software and the latter part emphasizes an inquiry-based approach to its integration:

> Our staff of five go in and get the teachers comfortable handling the machines, the PowerPoint, the Office 2000 Suite. The second half of the year is when we train the teachers, "Now you can browse and you know how to use Word, how do you actually use it in your classroom as an inquiry-based format?" We take them to sites that are educational, sites that we have them look at the different aspects of what is inquiry-based

> versus what is a worksheet, just reading information. We also show them different sites that they can go into to write lesson plans if they choose to, our server spaces, things that will help them as teachers….We require our teachers to write three inquiry-based interactive internet lessons, and along with that they can take one of those lessons and create a PowerPoint to present it to their classroom….we require the teachers to develop an instructional web page lesson.
>
> But also basically driving home the idea of what's inquiry-based, changing their philosophy about education…saying now that there's a tech room, these things are totally different: You become a facilitator. You're not in charge of the information. They [the students] are in charge and actively involved in finding the information themselves. You're there to facilitate. So it's kind of getting them to rethink everything they learned in schools….We want to make sure the teachers are using it effectively. That they're not using it for a worksheet, and they're not using it just to read and answer questions. That they're really truly understanding that in order for a student to be an active learner that they have to be involved, they have to make decisions….because that's where we found our biggest gains come from when the students take control of their learning and their engagement.

The district-supported professional development in technology is voluntary and unpaid. To be considered for advanced technology classrooms, teachers had to commit to weekly meetings for about nine months. The technology classrooms at the secondary level (grades seven to twelve) are implemented only in targeted core subject areas, so teachers outside these content areas who enroll in and complete the training are not assured of getting a technology-rich classroom the next school year.

During the first year the professional development opportunity was offered (beginning January of 1999 and extending up to the beginning of that school year) teams of two or more teachers were invited to attend the district supported technology professional development. At Jennings Junior High three grade seven teachers, two from social studies and one from science, were the first teachers to begin the technology professional development training. The following year three eighth grade teachers, again two social studies and one science teacher, attended the training for the 2000-2001 school year.

The teachers at Jennings concurred that the support provided to them was excellent. The interim principal also reported helpful, responsive technical support:

> I don't think you could get any more technical support in any aspect than what we have here….Any time there's a problem with the computer, we call them over there, and if they're not there we leave a message, usually within by the end of the working day they've gotten back to you,…Most of the time, nine times out of ten, that same day they're over here. I don't think you could beat that.

The professional development supports teachers in making a significant change in instruction. As it presented by the district technology staff, this inquiry-based model of instruction presents technology as playing an essential part in it.

Context Beyond the School

The district began its technology and curriculum integration reform when it participated in the state sponsored Multimedia Interactive Networked Technologies, or MINTs. The MINTs project was funded by a $2.7 million grant from Southwestern Bell (a telephone company). In six school districts in St. Louis County thirteen classrooms were networked and provided the same equipment that now makes up an advance technology classroom. Two district teachers from grades five and six were selected to participate.

Improvement in Teaching & Learning

Curriculum and Assessment Aspects of the Improvement

The technology in an advanced technology classroom, especially the Internet, allows teachers to expand the resources students draw upon, which is an important support to their inquiry-based study of the curriculum. An implication is the amount of time it takes teachers to find the resources. Another is that it demands a different assessment approach.

All six of the teachers we interviewed said that this inquiry-based technology-integrated instruction was correlated to the curriculum and standards for the state. Mr. Weaver noted that during planning time, the standards were "pretty much our blueprint. We wanted to match up our lesson goals and objectives to the Show Me Standards for our grade range, which is 5-8 [so] we can prepare the students for the MAP [the Missouri performance-based test]." He went on to describe how they also keyed their curriculum to the main information areas in the Terra Nova, the norm-referenced standardized test given to seventh graders.

The instructors have now aligned their lessons for the entire school year with Missouri Show Me Standards and integrated technology use into each unit. To organize lessons, they use a district-provided template, which includes a section for technology, Web site sources and the Missouri State Standard that each lesson addresses. While the teachers were guided to educational resource sites, Mr. Weaver, a seventh grade social studies teacher, described it as "a huge search" to find appropriate topic and reading level materials and that "a myriad of things went into the planning process before it was actually ever presented to the students." Seventh grade social studies teacher Mr. Lewis provided a familiar metaphor to describe the work: "As a teacher you have to do your homework. You have to go into those sites. You can't just say, 'Hey, today we're gonna get on the Internet'. To reduce the burden on teachers when new curricula are adopted, the district now provides Internet and software resources that are keyed to the State's curriculum standards and tests.

Along with an inquiry-based approach to instruction and curriculum aligned with the State's curriculum standards and tests, teachers have been asked to implement a different assessment approach. To assess the students' increased use of project-based learning activities, teachers were taught to use rubrics. These are scoring guides that describe what the teacher wants to see in that product. Teachers share the rubric with students ahead of time to help them understand what they must produce. This more descriptive approach to assessment is very compatible with the project approach, where students are expected to demonstrate what they have learned through their work with the technology. Cathy Sanford, a seventh grade science teacher, also indicated that when she adopted an inquiry-based teaching approach she felt it was necessary to adjust her methods

for assessing students' learning. Diana Gordon, an eighth grade social studies teacher, indicated that asking students to produce work and telling them ahead of time what she wants to see has been a change that she thinks helps the students to produce better work.

Teacher Practices and Outcomes

When preparing teachers, the district's Technology Integration Specialists said they emphasized that the inquiry approach would require them to adopt new roles and to take new approaches to their subject. The Technology Integration Specialists described that the teachers should act as facilitators, the students as producers of work, and the technology be used as a tool. When the teachers at Jennings Junior High were introduced to this view of the classroom, they felt it was an abstract concept that did not help them understand what, specifically, they should do with the technology. Mr. Weaver, a seventh grade social studies teacher, explained that while he had understood the description of an inquiry-based instructional approach, it was something that gradually sunk in and took on new meaning as he had a chance to try it out. After working in such a classroom for one-and-a-half years, he said he had become comfortable with technology and had come to understand inquiry-based instruction in a more concrete way.

> You are actually seeing the evolution of a teacher from a survival basis to a comfort level, [who is] now ready to take the technology and impose my will on it, more so than it imposing its will on me….What promoted more of an evolution [of my understanding] was me asking myself how to get more student participation in the lesson as opposed to [their] reacting more to what I give them…and seeing the computer, the tool that it is, that they could do that [participation] and do it reasonably well.…[Now I] Give the student a task to complete, with not too much in direction but enough in direction to where they have to do a lot of the problem solving in order to answer the main question, and bring things up in their own minds as to how best to go about tackling this, or sifting through hoards of information.

His description of inquiry-based instruction was similar to that of other teachers in advanced technology classrooms.

Cathy Sanford, the seventh grade science teacher, described how experience taught her that technology could undermine student learning if the assignment and assessment weren't structured correctly. "…I don't want them just to regurgitate to me what it says. They are very good at cutting and pasting. And if I'll allow them to, that's all they will do. So, I found that out I had to move to the level of, 'OK, give me a project. Give me something to show me what you've learned.' ".

The teachers said that in their classrooms they seek a new role for themselves and their students, where they are no longer fully in charge of the information and students are involved in determining and finding the relevant information and making sense of it. The teachers still feel very much in charge of their classes and are often at the center of the interactions there, for instance at the start of class, at the beginning of projects, and when providing direct instruction. While the students are working on inquiry-oriented assignments and projects the teachers circulate through the room and answer students' questions. At times they stop to "nudge" pairs of students who are not working well together, or who have gotten off task. If they encounter a number of students who are having problems, in order to redirect students' attention or provide clarification, they may stop the individual activity and work as a whole class for a while. If one pair of students locates an especially relevant Web site or reaches an insight into the work at hand, the teacher may ask them to share it with the class. Through these frequent interactions

they signal to the students that the roles of teacher and student are fluid, that sometimes an adolescent can be the teacher and the adult the learner. In general, the advanced technology classroom teachers work to provide enough direction so students stay focused, while allowing students to be decision-makers and problem-solvers whenever they can.

In the classrooms the teachers use a variety of software, including word processors, spreadsheets, presentation software (PowerPoint), and the Internet. Because of the students' fingertip access to the Internet and the scarcity of textbooks (which in some cases are outdated), there is an emphasis on teachers developing Internet integrated curriculum in support of inquiry-based instruction. As described earlier, teachers spend substantial amounts of time searching for relevant information on the Web that are appropriate for the age and reading level of the students to integrate into units.

Using Internet resources in class requires teachers to act as monitors checking that students do not go to inappropriate sites. If a student does, or deliberately damages the equipment, most teachers remove that student from the computer and give him or her bookwork assignments for a period of several days to several weeks.

Students often receive more freedom to move about technology classrooms to talk to other group members. In continue to receive this privilege, they were responsible for demonstrating appropriate classroom behavior when not being directly supervised. The seventh grade science teacher commented that student-to-student interaction was something she encouraged for her students, but that she had to get used to it.

> I have to be very careful when I see a student get up and move on the other side of the room to find out from someone else what they are doing or how they are doing or how they are processing. Because I used to be a sit-in-your-seat-teacher, and "don't move out of that chair."

The six advanced technology class teachers at Jennings Junior High were very positive about their new tools and pedagogy. One teacher commented, "I wouldn't teach any other way now. I mean I would if I absolutely had too. But, I just really hope that there never comes a time when I'm without a technology classroom." Other teachers expressed similar positive sentiments. One indicated that he was committed to **"**always looking to improve, always looking to get more out of less: less time, more product, less waste, more seeing that the student benefits out of more self direction with instruction." Mr. Lewis, an eighth grade social studies teacher with twenty-five years of experience, described a total shift in his point of view as a result of his experience with the district training and an advanced technology classroom.

Ms. Sanford was effusive in her support for technology use in support of instruction:

> If you want to see your children, your students actively engaged without any input from you, or let me say with only minimal input from you, and learning still happening, you want to do this. You want to do this. It's not about you, it's not about me. It's all about them. When you see them, I mean they have an "I got it" kind of look. You know, so, if you want to see animation…and you want to see activity, and you want to see engagement…then you have to do this….I wouldn't teach any other way now. I mean, I would if I absolutely had to. But I just really hope that there never comes a time when I'm without a technology classroom. I see the difference in the kids.

After they have taken part in the technology staff development, the teachers tend to continue to collaborate on their technology-enhanced curriculum. The pairs of social studies teachers at seventh and eighth grade had strong collaborations. After the initial training, they continued to

work together and re-write curriculum, to incorporate the Missouri Standards and various Web sites. The six advanced technology classroom teachers in this building often consult one another about technology problems or issues.
Social studies teacher Mr. Weaver in the fall of 2001 received the honor of being chosen for a Milken Family Foundation National Educator Award. Dubbed the "Oscars of Teaching" by Teacher Magazine, the honor included a cash prize and an expense-paid trip to a national ceremony honoring all the national recipients. Two key criteria for his selection was his outstanding instructional practices in the classroom, school and profession and his success in motivating and inspiring students, colleagues and the community at large.

Because the success of the advance technology classrooms does rely on the teachers' preparation to use the equipment, a trained teachers' departure can cause problems. During the school year of our visit, one teacher in an advanced technology classroom left the district when her spouse was transferred in the middle of the school year. The district leaders did not put an untrained teacher into the room or move a trained teacher out of his or her classroom to the advanced technology classroom, so it remained unused during the remainder of the school year.

Student Practices and Outcomes

In the advanced technology classrooms students are regularly given an overarching question to guide their work. They then use ICT to find information and to represent what they have found. For example, one social studies assignment we observed was to "define and compare two forms of servitude [the feudal system and slavery] from two different regions and time periods." To do this, students worked at the computers, mostly in pairs, looking for information on the Internet. They wrote their notes on worksheets the teacher had prepared. The unit required students to compare and contrast feudalism and American slavery, examine cause and effect relationships, and evaluate and interpret primary and secondary historical sources. The students spent between two and three class periods gathering information. By circulating through the classroom as students worked, the teacher was able to judge when students had gathered sufficient information. Their next task was to use the computer to make a Venn diagram, which they then used to organize their material. They were then to summarize their findings in PowerPoint presentation.

In another section of the building, Ms. Sanford's grade seven science class students were just beginning their study of obesity in adolescence. As the class began, several students eagerly raised their hands to pose a question to Ms. Sanford. Ms Sanford acknowledged each student who had a question, yet never gave a direct answer to them. Instead, she re-directed each student's question asking, "How do you think we can find an answer to that question?" Students appeared to enjoy being encouraged to seek out their own answers to questions. To assist them in their quest for answers, they turned to the Internet as a readily accessible tool to assist them in their quest for answers.

In observing the students use the Internet, it was clear they knew needed to find the relevant information, put it into their own words, and then process it to represent what they found out. During the several class periods we observed, they were encouraged by the teachers to formulate their own questions, follow their hunches and interests, and translate these into key words for search engines. The students enjoyed this approach and nearly all of them we asked said that

finding relevant information was easier using the Internet than using a textbook. They told us they preferred while the Internet because it returned information faster, but that they still had to read through the Web sites to determine if the information was pertinent to their topic or not.

In addition to search engines students found word processors were a big help to them in composing their thoughts and editing their work. In a focus group, several students elaborated on how the computer aided their writing, assuring us that it helped them learn to do this for themselves and did not mean they did not have to learn to revise and edit.
When it was time to work on the computer, the students nearly always did so in pairs. The teachers and students alike agreed that this had students interacting about the subject under study more often, and that this was beneficial. When students worked together, they often took on different responsibilities: students who were more advanced in technology often helped students who were less skilled; they checked with each other about Web resource information; they delegated tasks in order to complete the projects. One of the advanced technology classroom teachers explained that she saw the students' taking on more individual responsibility, and differentiating roles within groups; this led to their being more selective about whom they worked with, to ensure they had the right complement of skills.

Students described that sometimes problems arose when a more skilled student was teamed up with a less skilled student who didn't listen to advice about how to operate the computer. Or, when using the Internet, sometimes the partners disagreed as to what sites to visit, or which keywords to use. Most pairs of students indicated that they took turns controlling of the keyboard and mouse in order to alleviate these conflicts.
The eMINTs project evaluation analyzed participating districts' MAP test results in 7th grade science and 8th grade social studies between 1999 and 2000. The data showed that in these two areas the number of students scoring "proficient' or "advanced" from the Jennings Junior High increased at a rate higher than students statewide. The number of 7th grade science students scoring in these two highest scores increased in Jennings by 5.51%, compared with 5.31% statewide. The increase in 8th grade social studies was 22.36%, compared to 16.2% statewide. In the year 2000 these 8th grade students would have been receiving social studies in an advanced technology classroom for the second year in a row.

The interviews and focus groups at the school provided qualitative data on the impact of the technology on student outcomes. The students reported several reasons why it was important for them to have regular access to ICT. They felt the Internet provided them with more up-to-date information than did their books, and also provided a variety of perspectives. One student said that he thought that the Internet provided more in-depth information than was available in his textbooks. He went on to explain that he thought that Web pages forced students to read differently, skimming for information, since it was not guaranteed that an answer or fact they sought was even on that Web page. Another student commented that he thought word processors made it easier for him to write well, and they improved the appearance of his products.

According to both teachers and students, the advanced technology classrooms support several other positive outcomes. Students voluntarily stay after to school to work on assignments; they are willing to attend Saturday school so they can access technology to complete their work; attendance is up; and students were excited about learning. Mr. Lewis noted that he saw better

behavior in his classes now: “Another plus would be, I don’t have the behavior problems that I once had, because kids come to class now with the willingness to learn. And they know if they misbehave they’re off the computer. Most of them don’t want that.” In addition, students report that they are interested in becoming computer technicians and programmers as a result of their positive experience with computers.

The focus group of seventh and eighth grade students expressed some frustrations about differences they saw between their current technology-rich classes and technology in previous years, including in junior high. The group concurred with one student’s assessment that “we really don’t get enough time to like, just free ourselves and go on the Internet and just explore as much as we want to.” They also indicted that they thought that the periods in the junior high were too short (they are 50 minutes long), because just after you “got going” on some research and a task, the class period ended.

Lessons for the future

Noteworthy Outcomes

Student achievement on the state MAP tests increased at a faster rate than students in other districts in the state. In addition, teachers reported increased student attendance and engagement and fewer discipline problems. The students explained that they enjoyed using the technology as an information source and support to their learning, and found it an important tool to which they would like increased access.

The teachers reported changes in their instruction and assessment practices. The teachers indicated that while making this change was challenging, and time-consuming, they were happy to be a part of the technology-supported improvement at the school, and were proud of what they had done.

Added Value from Technology

Through the advanced technology classrooms students received increased access to up-to-date information from a variety of perspectives. They also had access to software tools, such as word processors and presentation software that assisted them in expressing this information in their own words. The classrooms provided teachers with tools to support an inquiry–based instructional approach, as they had learned through the extensive professional development offerings. To date, the implementation plan focused on social studies and science, with English as the next planned expansion area. Thus, all the school’s students would experience an inquiry approach in nearly half their school day.

Key Implementation Factors

The Superintendent, speaking for himself and the staff, who all agreed, identified five critical components in successfully implementing inquiry-based, advanced technology classrooms: pick the right teachers and provide them with the right training. Next, make sure you have the right kinds of tools in the classroom at a 2:1 ratio to really allow the instruction to change. Another

critical element was the right technical support. The last thing he mentioned was the right leadership, "because without that none of this other stuff will happen and we wouldn't know what to do."

The Jennings School District's superintendent has a clear vision for technology use and expansion in the district, which is important to Jennings' success. Superintendent Stewart shared his insights as to what is needed to sustain technology integration and implementation:

> I think it's a leadership question and an attitude question….So I don't think it's a big cost issue just to begin with. We're fortunate. We have e-rate, and that's helpful to us, too. But we were spending $5,000 or 6,000 a kid with getting virtually no results, then for changing year round spending about another $100 to $200 a child and getting significant results---the educational community ought to figure this one out. But they don't. The sustainability of it [a district's re-allocation of resources for technology] really does require that all superintendents change the way they do things.

As indicated above, the superintendent fully supported bringing technology into the districts' classrooms and invested funding to do so. But because Jennings is not a wealthy school district, this was largely a re-allocation of funds supplemented by the e-rate funds from the federal government. Ted Vytacil, Director of Technology and Steve Schmitz, Assistant to the Superintendent for Telecommunications and Technology Development, discussed the different strategies the district used to save money:

> One of the things that's kept us in terms of economy is doing as much as we can in-house… [for hardware purchases] I will often do a market survey. Brian will get on-line and look at what's available at what price, we'll compare those things, and then we'll choose a vendor to make a bid, rather than go with an RFP [request for proposals]….[we] call a vendor at the end of the third quarter when we know that they're looking for revenue…. I get a price from them, and I say, "I won't accept that"…[which] has given us a lot more for the dollar than we would've gotten otherwise.

To further control costs and reduce the number of people required for technology support, they allow only the use of software adopted as a district standard. They discourage the use of propriety software because they feel it is difficult to maintain. They employed other cost saving methods such as purchasing standard tables rather than specialized computer tables. The district's Technology Director explained the extent of their self-reliance: "As far as networking, basically we do everything in house… we put everything in from the cable [on up], the maintenance department runs the power. Everything is done within the district as much as possible."

This self-reliance has also built up considerable expertise over a wide range of skills. Together, the highly competent technology team members and technology-trained educators, in consultation with the Superintendent, make the majority of district's technology-related decisions. This supports the sustainability of the technology use in the district because the necessary expertise is available for future efforts. The technology department is adequately staffed and well qualified. The district has grown its instructional expertise in a manner similar to

its development of in-house technical support. The original two teachers who participated in the pilot MINTs project are now the Technology Integration Specialists for the district.

The district has a comprehensive plan for allocation of funds and resources for technology expansion. The Superintendent projected that there will increase the number of advanced technology classrooms by fifteen for the next school year. Lessons that are learned from each year's gradual expansion of technology classrooms are taken into consideration for the next expansion.

Challenges

More teachers would have liked to receive an advanced technology classroom than could be accommodated, but everyone seemed to accept the fact that expansion was limited because of funding.

The teachers were not compensated for the time they spent in the yearlong professional development experience. The staff members did not see this as a problem. Instead, they were pleased that the training was available to them and more enrolled than there were advanced technology classrooms available, in the hopes that they might be able to receive one.