connect

Learning in a Connected World: Harnessing the Potential of Technology

June 2003

TABLE OF CONTENTS

1 Vision Into Action for Education

"... the single most important application of information technology is to improve education."

Bill Gates
Chief Software Architect
Microsoft Corporation

The process of learning is not confined to the time spent in a classroom, with homework or on field trips. Learning involves many facets of activity and information flow that form a learning ecosystem. Today's learning faces many barriers, including social, economic and technology constraints. Yet technology can effectively address these challenges.

In order for technology to improve education, schools must consider the total environment and fully understand the learning ecosystem. Barriers present in the ecosystem must be illuminated and appropriate technology-based solutions must be applied to overcome those barriers and thereby assist educational organizations in achieving their goals. Microsoft technologies, as well as initiatives in global information technology standards, provide a broad range of capabilities for improving the learning ecosystem.

Schools today require flexible and cost-effective growth, including the use of existing technology and the ability to adapt to change. Therefore, the learning ecosystem must be agile, capable of changing and growing as new innovations occur in teaching, learning, technology, and as the needs of the ecosystem evolve and mature. Envision the possibilities of such an ecosystem, a community of learning for teachers, parents, students, and administrators in which:

- Each has access to personalized learning on a range of devices—anywhere, anytime—individualizing their learning capability and accelerating the learning cycle.
- Each is empowered to harness new technologies and learning applications, eliminating time-sapping struggles with the mechanics of learning.
- Learning is fully integrated with learners' individual lifestyles and preferred learning styles—seamlessly adapting to their personal needs and abilities.
- A newfound comfort level with learning cultivates deeper perspectives and fresh viewpoints, igniting learners to explore the intricacies of learning itself and how it applies to their world.
- A limitless learning environment levels the playing field and knows no economic, ethnic, political, or social boundaries.

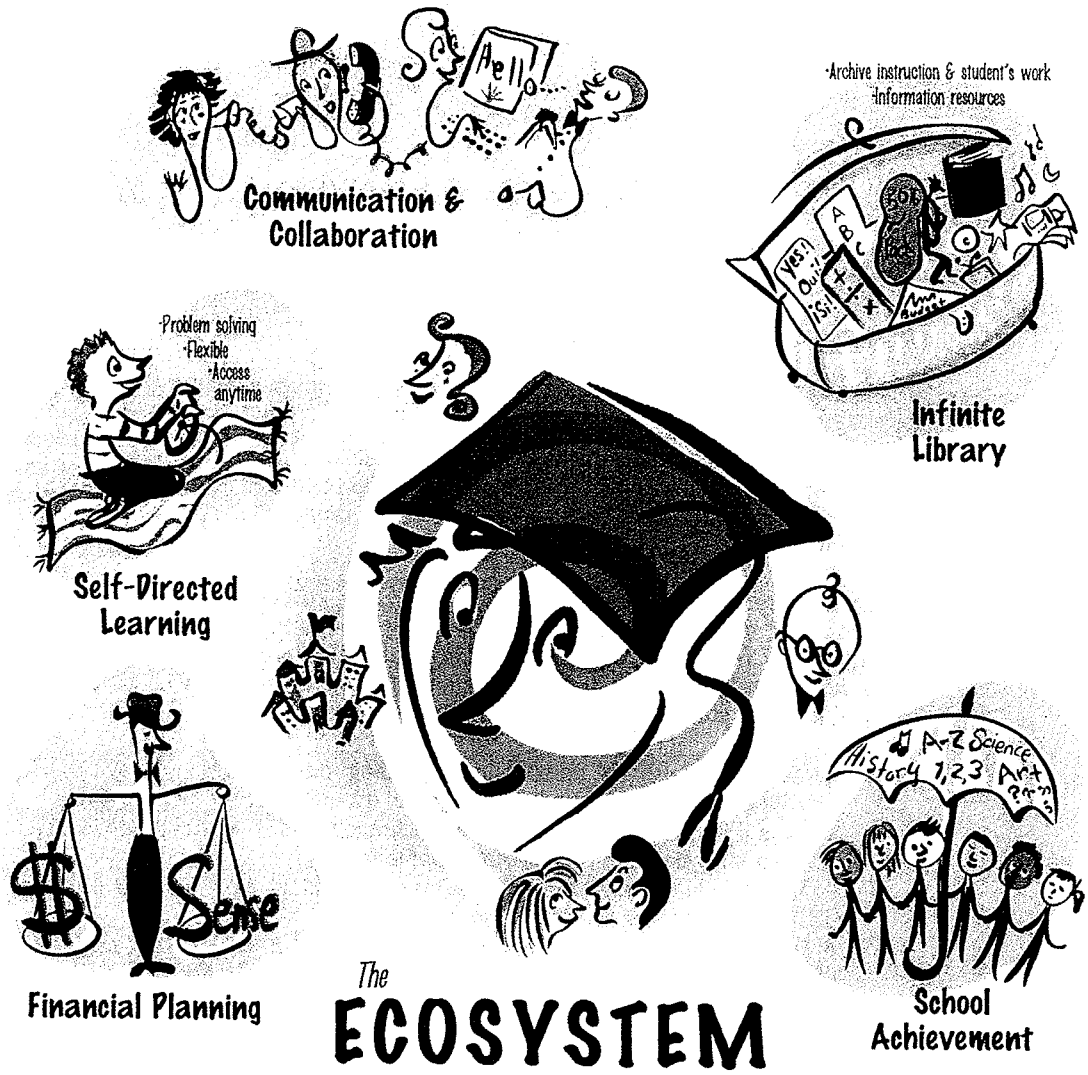
This is the Connected Learning Community.

The Connected Learning Community is Microsoft's vision for lifelong learning. Connected learning today and in the future gives rise to a next-generation learning ecosystem powered by technology solutions that support highly accessible, engaging, and personalized learning in a connected world.

This document illustrates these dynamics and demonstrates Microsoft's capability to improve the learning ecosystem using existing standards and technology. Section 2 describes elements of this learning ecosystem, and illuminates key challenges to building such a learning environment. Section 3 presents an approach for leveraging technology to construct a vastly improved learning ecosystem while addressing many of the current challenges. Section 4 outlines key resources schools can access to begin building a path towards a more effective and comprehensive learning ecosystem.

2 The Learning Ecosystem Described

The learning ecosystem involves many parties: students, teachers, parents, administrators, government agencies and the community at large. Access requirements to facilities, curriculum, and general information are many and varied. Activities within the ecosystem also vary greatly between environments, from those within the confines of today's brick and mortar schools; to virtual schools across the Internet; to radio or satellite links for very remote communities. The learning ecosystem deals with a vast set of challenges in the process of assisting with outcome-based learning and attaining the highest level of educational achievement.

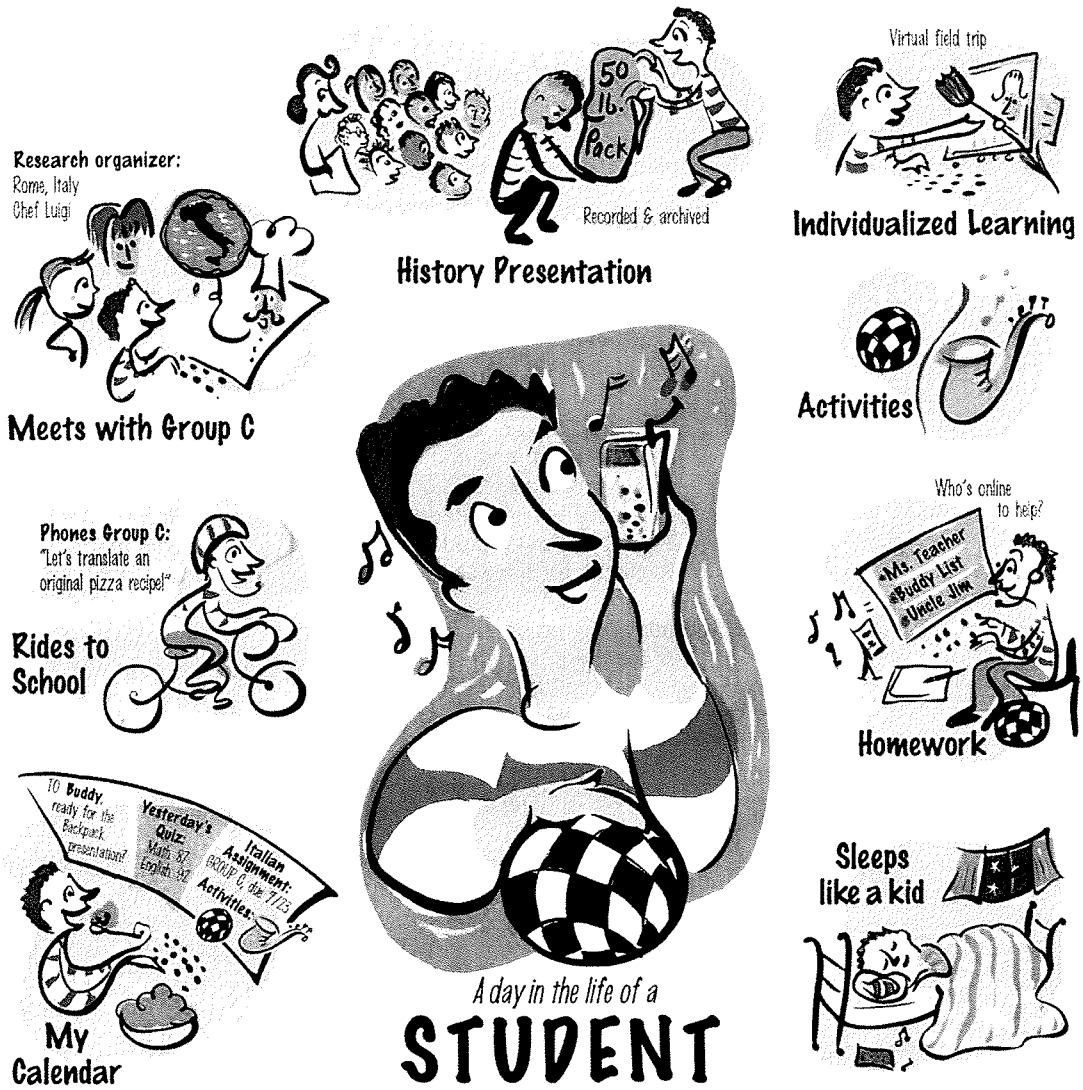


The Connected Learning Community approach addresses the many facets and challenges of today's learning ecosystem, and recognizes the potential to achieve greater degrees of connectedness among all parties to foster higher learning outcomes. Through standards and technology, the Connected Learning Community enables a more effective learning ecosystem. In this ecosystem:

- Students work and collaborate both inside and outside the classroom. Learning is personalized and self-directed. Students have flexible, anytime access to infinite resources. Students learn and achieve in new ways
- Parents are kept informed of their child's progress at all levels. They can access assessments and teacher feedback and communicate with teachers and administrators. School performance improves, as does their child's education
- Teachers access rich content resources and tailor instruction to the needs of individual students. They track student progress and rapidly take appropriate action when necessary. Teachers communicate easily with parents, administrators, and each other. Flexible, self-directed professional development enables teachers to continuously improve their skills
- Administrators work in an integrated environment where student information is seamlessly integrated between systems within the school, across schools, and with government agencies. Work processes are streamlined and automated. Administrators easily communicate with stakeholders, manage costs, and improve school performance

2.1 Students in the Ecosystem

Students are busy. With demands on their time both in and out of school, they juggle multiple projects and responsibilities. Students need tools that will help them overcome challenges and manage their learning and their lives. They need a learning ecosystem that enables them to make the most efficient use of their time. They also need tools that meet their diverse learning styles and situations. With a more effective learning ecosystem, a day in the life of a student is more easily managed and productive, and their learning experience enhanced.



2.1.1 In the School

As the learning ecosystem evolves, the classroom will evolve from a room with desks all arranged facing in the same direction to a place where students can ask why, how, and when in exciting, interactive ways. Students will have access to well-equipped learning labs where they can easily work alone, in groups, or with a mentor. Students can participate in classes led by experts around the globe through powerful learning technologies. Multiple classrooms will be linked together, and classroom instruction and student presentations will be archived for later review or on-demand use. Students will have access to their personalized learning environment from anywhere in the school, and even between schools. They'll be free to express their ideas in rich and dynamic ways. Students will be able to work together on group projects, and even collaborate with students and experts outside of their school.

2.1.2 Beyond the School

Learning does not end when the class bell rings. Interactive and collaborative projects require the students to work together outside of class time. In the learning ecosystem, students can have the

convenience and flexibility to use available devices (PDA, TabletPC, laptop, a friend's or public personal computer, etc.) to continue working when away from school, knowing that information and resources that need to be shared with their peers will be automatically updated real-time if they are connected to the Internet, or when they return to school and synchronize with their main system. In this way, they can take their learning environment home so that their parents can help them in their learning tasks.

In an effective and comprehensive learning ecosystem, students can:

- Manage their time
- Work collaboratively
- Learn effectively outside of school
- Access powerful tools for learning and presenting
- Quickly and conveniently access personal and global learning resources anytime and anyplace
- Query subject matter experts without limiting time and geography constraints

2.1.3 Challenges to Improving the Learning Ecosystem for Students

There are a number of challenges that students face in the current learning ecosystem. The following are just a few of the more prominent factors that affect their ability to learn:

- **Time:** Students have very busy schedules, making it difficult to work collaboratively on projects. Students have multiple demands on their time, including music lessons, sports, looking after siblings and jobs. It's more and more challenging for students to find time to work together.
- **Interest and Attention:** Today's learners are accustomed to being entertained due to special effects on TV and in movies, and immersive experiences such as video games. Educators find that adequately engaging students is challenging as a result.
- **Diversity:** Students have varying needs. Kinesthetic learners have different requirements than reflective learners, for example. Students with visual impairments may only have one large print resource book available for a research project where other students have access to dozens of resources.
- **Equitable Access:** Many students lack easy access to quality learning materials, resources, technology, their teachers, and in some cases, their own parents. This is in part economic, in part social, and in part cultural.
    - **Economic:** Not all schools or families can afford to provide computing access or network connectivity.
    - **Distance:** Distance or geographic location can limit students' access to outside speakers, educational options, courses, or the ability to work collaboratively with others.
    - **Cultural:** Some students are limited to only those instructional materials available in a particular language or that present a particular perspective.
    - **Accessibility:** Not all instructional resources are available as large print, in Braille, or as books on tape. Physical or motor function impairments make it difficult to access information or participate in certain activities.

2.2 Teachers in the Ecosystem

Teachers are on the "front lines" of education and one of the most critical factors to student success. They are the designers of learning activities, the providers of feedback and the intermediaries that understand why a particular student may be thriving or struggling. In today's knowledge economy, teachers are required to be accountable for more information than they have time to absorb. Information systems must help them assimilate knowledge in a time-saving, not time-consuming, method.

2.2.1 In the School

In the learning ecosystem, teachers can draw on a multitude of rich tools and resources including other teachers or mentors. They will benefit from the cumulative knowledge and experience of their peers. They will be able to draw on a rich collection of digital learning resources, each evaluated and ranked by their peers, and accompanied by detailed documentation on how they were used effectively by other teachers. Teachers will be able to use automatically graded assessments to ensure that their students receive timely feedback, and to track how each individual student is progressing. Administrative tasks will be automated to save their valuable time.

2.2.2 Beyond the School

Teachers can take their personal teaching environment with them when they leave school and continue to provide their students rich, personalized, and contextual feedback on their work. Teachers do not need to be tethered to a network connection, meaning they are free to work at the time and place of their choice. When they return to school the following day, graded papers will be returned promptly and efficiently to each student without occupying valuable class time. Since parents are able to monitor their own child's progress and receive notifications or "advance warnings" as issues may arise, teachers can spend their valuable time working proactively with parents instead of simply trying to keep parents up-to-date on their student's progress.

Teacher skills and their ability to use technology to support best practices around learning are essential for creating successful learning environments today. Hence, professional development must be ongoing and embedded into their daily activities. This learning ecosystem provides professional development

that's personalized, convenient, and self-directed so teachers can fit it into their busy lives, when they need it. Their professional development learning will be immediately applicable in the classroom, as well.

In an effective and comprehensive learning ecosystem, teachers can:

- Manage their time
- Streamline administrative tasks
- Plan effective curriculum
- Meet individual and group learning needs
- Pursue continuous professional development
- Communicate with parents, peers, and administrators

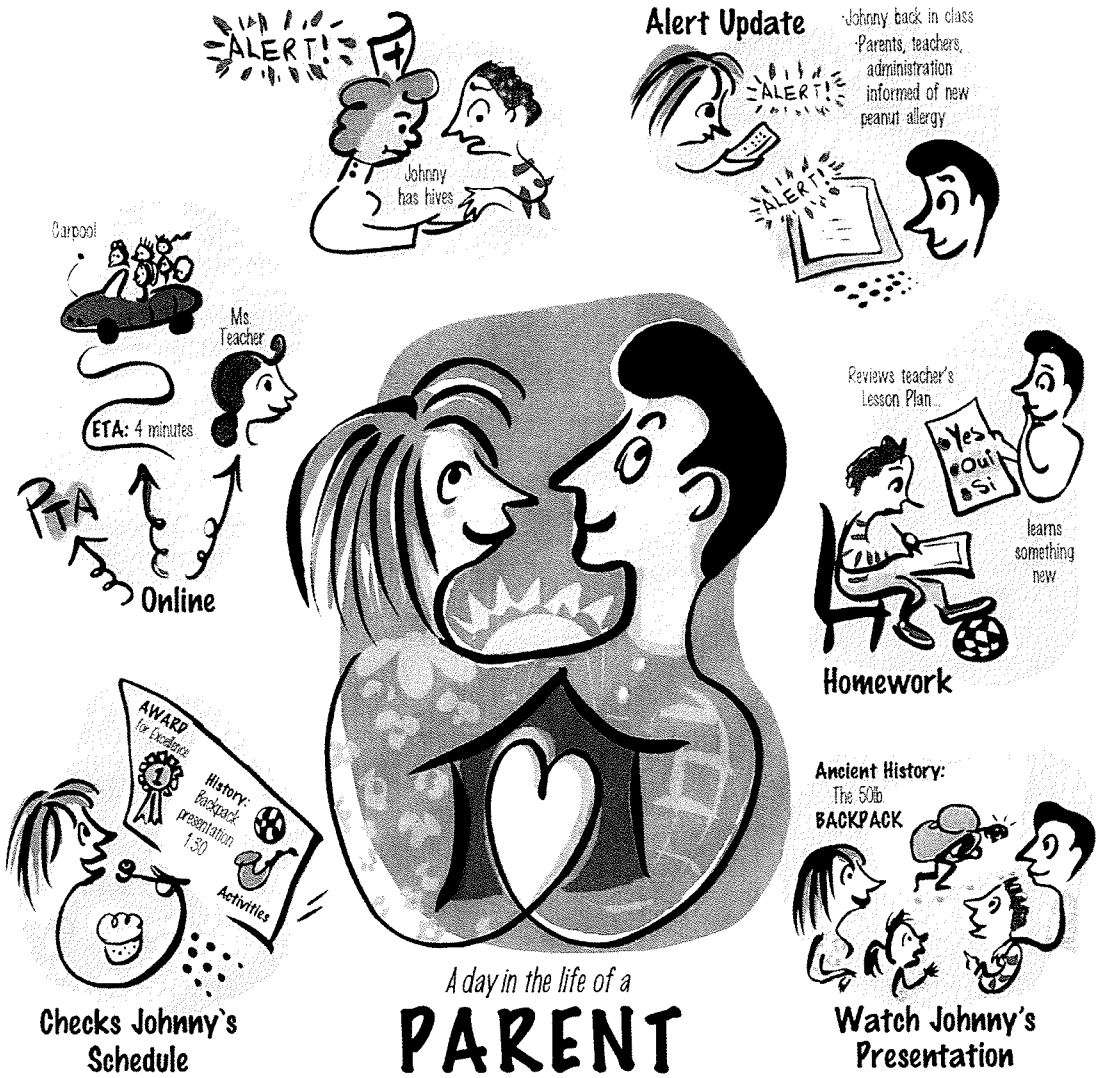
2.2.3 Challenges to Improving the Learning Ecosystem for Teachers

There are a number of challenges that teachers face in the current learning ecosystem. The following are just a few of the more prominent factors that affect their ability to teach and learn:

- **Student Information:** Information about students ranging from attendance to test scores to discipline reports is often not readily available to teachers. Teachers must know how to navigate disparate information systems to access vital information about an individual student.
- **Professional Development:** Traditional professional development can often be time-intensive, occurring in a classroom or course setting with a sole focus on how to use technology. Teachers prefer to learn based on a much closer association of how to infuse the use of technology in their classroom. They also desire professional development strategies and learning approaches that cater to their needs for flexible, real-time learning when they need it, individualized learning to fit their unique learning preferences and levels of understanding, and on-going reinforcement and support when they need it.
- **Curricular Materials:** Teachers lack access to a diverse body of curricular materials that allow them to individualize the learning experience. They typically have access to materials that address only one learning style.
- **Best Practices:** Teachers lack easy access to the best practices of their peers.
- **Isolation:** Many teachers feel isolated from other teachers. They lack the opportunity to interact with their peers and other educators.

2.3 Parents in the Ecosystem

Parents lead hectic, busy lives, and they require easy access to information about their child's education. This information enables them to take an active role in helping their child succeed in school and in life. Parents also need schools to streamline communication and school-related activities like buying uniforms so they have more time to be engaged with their children.



2.3.1 In the School

Parents in an effective learning ecosystem can take active roles in preparing their child for success. They will know what is happening in school through easy access to contact information, calendars, presentations and reports from school administrators. They will access up-to-date information on how students in their child's school are progressing compared to other schools, and how their child is progressing relative to their peers. Parents will be able to see if their child has homework, the child's actual work on current and previous assignments, and grades and additional detailed teacher feedback.

2.3.2 Beyond the School

With access to critical information and more time to be involved, parents can take action outside of school to support their child's learning. Parent-teacher conferences can be proactive instead of reactive. Parents will be able to find supplemental activities or resources through the online shop to help their child learn in certain critical areas.

In an effective and comprehensive learning ecosystem, parents can:

- Manage their time
- Access school-related information
- Actively participate in education
- Track their child's progress
- Be connected and informed

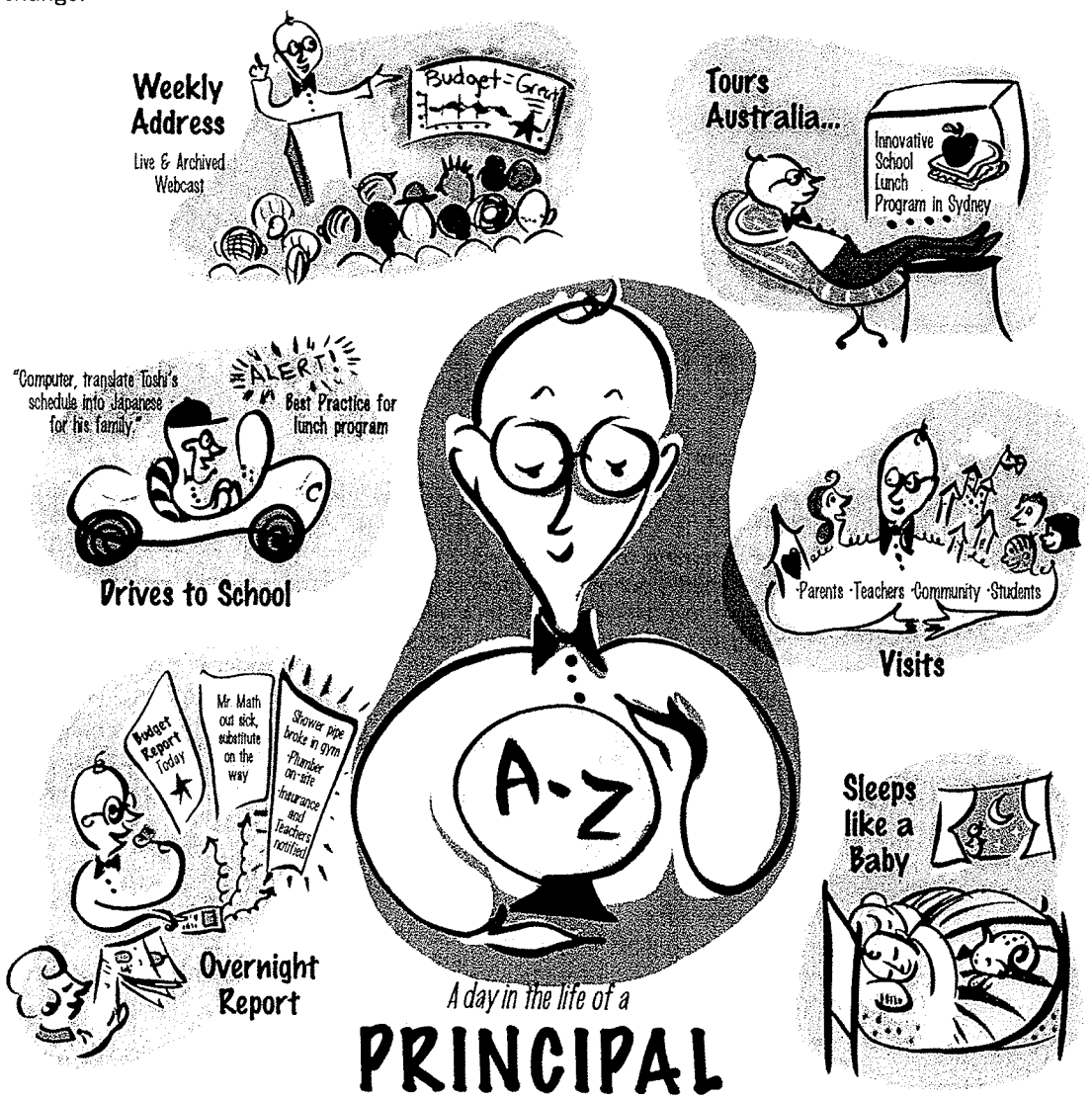
2.3.3 Challenges to Improving the Learning Ecosystem for Parents

There are a number of challenges that parents face in the current learning ecosystem. The following are just a few of the more prominent factors that inhibit a parent's ability to be actively involved in supporting their child's learning experience:

- **Assignment Data:** Parents typically have to rely on their child to tell them what is happening in school: if they have homework, how they did on previous projects, what they are currently studying, and upcoming events.
- **Performance Data:** Parents often find out about poor performance when it is too late to take action.
- **Time:** Parents have demanding schedules, making it difficult for them to take a more active role in education, attend presentations, and participate in meetings about school initiatives. Parents also find it difficult to meet with busy teachers.

2.4 Administrators in the Ecosystem

Administrators need an environment in which student information is seamlessly integrated between management systems within the school, across schools, and with government agencies. They must be able to track and improve student and school progress, and be informed about potential problems and opportunities so they can take immediate action. Administrators need to clearly communicate with parents, teachers, and the community. They must control costs, yet remain flexible and adaptable to change.



2.4.1 In the School

In the learning ecosystem, systems will provide the basis of cost and management accounting for the school. Information is linked to yearly budgets and reported directly to the education department. Administrators will easily access financial records and create their own customized reports. By integrating various functionalities within the school with the financial systems, they will be able to track items such as photocopier use and be automatically notified of unusual activities. Financial information is up-to-date, enabling administrators to make decisions informed by accurate and reliable data. Student information will be entered and edited only once, with all other applications needing that information updated automatically and in real time. In this learning ecosystem, administrators will see which students are progressing or falling behind, and take appropriate action, such as ensuring that a teacher is participating in appropriate professional development or that another is rewarded for innovative work.

2.4.2 Beyond the School

Student management challenges will be addressed through integration of several key record based systems. Technology standards will allow easy exchange of student records between school systems and exchanging records with other schools or higher education institutions will be easy and efficient. Best practices and processes will be easily shared between schools, with privacy and security consistent through key operational standards.

In an effective and comprehensive learning ecosystem, administrators can:

- Manage their time
- Streamline administration
- Employ best practices
- Stay informed
- Communicate with stakeholders

2.4.3 Challenges to Improving the Learning Ecosystem for Administrators

There are a number of challenges that administrators face in the current learning ecosystem. The following are just a few of the more prominent factors that affect their ability to tend to the business of education:

- **Data:** Administrators lack the timely and accurate data needed to take action. They know certain students are falling behind, but cannot pinpoint possible causes. Administrators also lack the tools for analyzing raw data. Many administrators use old or out-of-date information to make important decisions.
- **Funding:** Technology in schools is often grossly under-funded, thereby putting additional pressure on administrators to develop innovative financing strategies. Funding is often provided through grants and special programs, making it difficult for administrators to put into place long-term technology plans.
- **Documenting Performance:** Administrators need to demonstrate improved performance of the schools and be able to correlate and direct school-related investments to improvement goals.

The possibilities envisioned with an effective and comprehensive learning ecosystem can be achieved and the challenges overcome with the Connected Learning Community approach.

3 The Connected Learning Community Approach

All ecosystems require balance in order to function successfully. Each element and party within the system has a role to play and through this will influence the sum of the parts that represent the learning process. Keeping such an ecosystem in balance requires key partnership commitments between schools, educational institutions, students, parents, and government agencies in order to sustain a long-term environment.

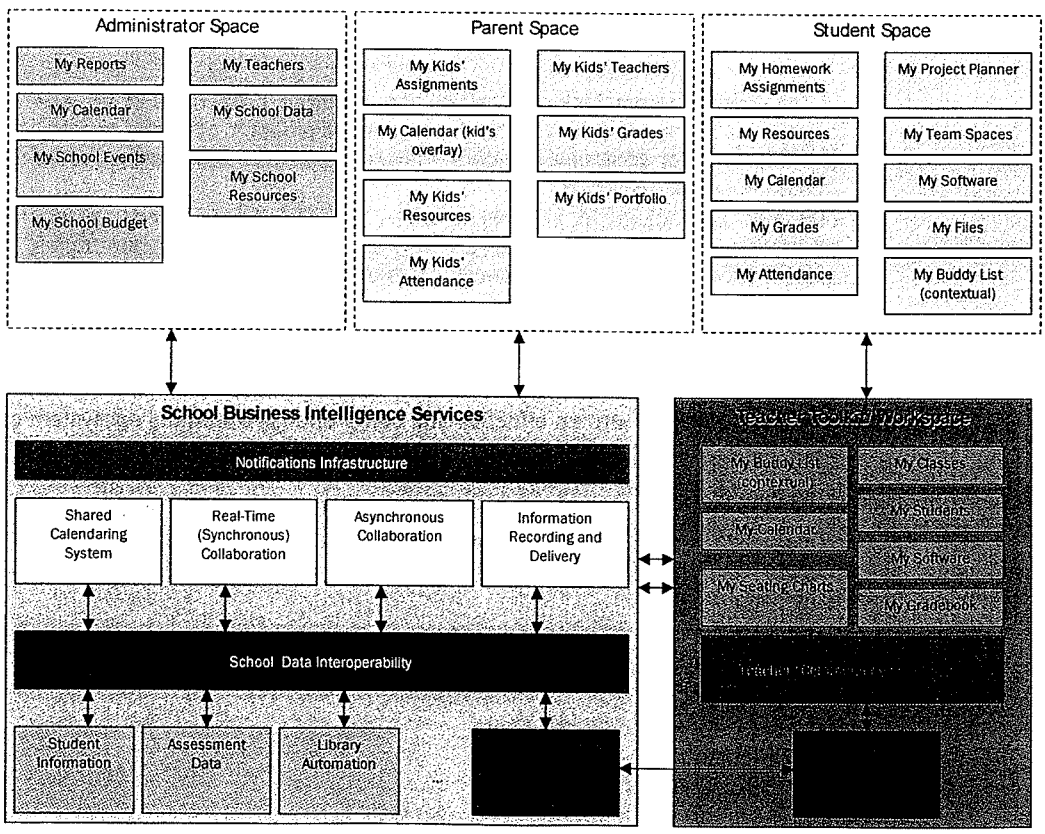
Within the ecosystem, access to appropriate and reliable information is crucial so that stakeholders in all parts of the system can make informed decisions and take appropriate action. The ecosystem must also address the time and cost dimensions in automation and the streamlining of key tasks, and allow an evolutionary approach to cost management. The notion of connected learning today and in the future also must consider the challenges of changing social and political pressures in a world of constant technological innovation and improvement.

The Connected Learning Community Approach enables such an ecosystem. The Connected Learning Community is Microsoft's vision for a world that encourages lifelong learning. It removes time and space constraints and enables a world of flexible learning, rich content, community involvement and more. The Connected Learning Community approach is not a single entity or product, but a series of architected frameworks, global standards, and best practices. The following outlines this framework for improving the learning ecosystem, including learning, teaching, parenting and administration scenarios made possible when applying this framework, and the design objectives for making this potential real.

3.1 A Framework for Improving the Learning Ecosystem

Although specific products such as hardware and software come and go over time, the fabric that binds a learning ecosystem must endure through successive generations. This fabric must also be sensitive to change in such a way that it is capable of progressive improvement without the need for expensive, large-scale replacement in future years.

Engineering such an ecosystem requires processes, standards and a range of technology and architecture that map directly into learning activities.



This mapping can be viewed as a framework of building blocks tied together by an underlying fabric of interoperability, communications and collaboration services, school business intelligence, and technology standards. These are the building blocks of the technology infrastructure that will address challenges found in the learning ecosystem of today, and enable the Connected Learning Community of tomorrow.

3.1.1 School Data Interoperability

Data interoperability enables disparate applications whether centrally hosted, or locally hosted and administered to share and orchestrate student data lowering total costs and improved by reducing double entry of data. Data interoperability normally consists of:

- A common data model for student data, expressed as XML schemas
- A common set of protocols for exchanging data in the common data model between applications
- A data security and data privacy model enforced by the system
- A set of common business rules governing the sharing, replicating, and updating of student data in a reliable and secure fashion

3.1.2 Technology Standards

Schools need a flexible infrastructure that fits their unique needs. This infrastructure should be based on open technology standards such as XML and Web-based services communicating over the HTTP protocol. This allows loosely coupled systems to function as one. In this fashion, mission-critical information can be housed in secure data centers which can be centrally supported, and various services can be provided through application service providers according to service level agreements. This technology infrastructure is modular in nature, enabling the ability to expand service offerings while reducing the need for major technology infrastructure replacement initiatives. By using open standards over loosely coupled networks, governance of and accountability for these resources can be assigned to a single agency. This approach yields a flexible solution which facilitates the organizational agility required by the demands of the ecosystem. Global information technology standards including the Schools Interoperability Framework (SIF) and the Instructional Management Systems Global Learning Consortium (IMS) are also necessary components of the infrastructure.

3.1.3 Communications and Collaboration Services

The communications and collaboration fabric provides essential services which will be consumed by the student, parent, teacher, and administrator education spaces. These services include:

Messaging	A robust messaging infrastructure which can provide: • "Safe" or filtered e-mail for students • E-mail services for parents, students, teachers, and administrators available through standards-compliant clients or Web browsers in multiple form-factors, including mobile phones and personal digital assistants • Services for group collaboration including document storage, workflow automation, and discussion areas
Internet Access	A robust infrastructure which can provide "safe" or "filtered" Internet access for students and teachers, able to apply policies as determined at government, local education authority, school, teacher, and/or parental levels. Furthermore, teachers will require the ability to easily monitor and manage access to certain technologies in order to efficiently manage classroom and learning activities.
Calendaring/Scheduling	Provides access to individual and group calendars, delegated administration for calendars, and scheduling of individual time and resources. Calendaring services should also provide access to calendar information (such as free/busy time) in a flexible fashion, enabling the secure and reliable sharing of calendar information with other systems.
Presence	A robust presence service provides information about users' online status. The presence service needs to respect an individual's right to privacy by enabling them to control who can see their presence and by overriding their default presence status.
Real-time Communication and Collaboration	Includes services such as instant messaging (including computer to mobile phone), chat, virtual classrooms, shared whiteboards, application sharing, video/Web conferencing, and audio conferencing (including computer to computer, computer to phone, and phone to phone).
Video/Web Conferencing	Includes scheduling of resources such as network bandwidth and optimized routing for resource-constrained networks. The scheduling of people and physical resources should be coordinated with the calendaring/scheduling service.
Real-time and On-demand Information Delivery	Includes reliable and secure transmission in network-efficient matters enabling users to view live presentations and review them later in an on-demand fashion.
Notifications	The notifications fabric is responsible for the secure and reliable delivery of information to users based on their user profile and presence status. The notifications fabric is a consumer of profile information and presence service (is the user online) so that information can be securely delivered to the user according to business logic determined by the user. The notifications fabric should be robust to handle delivery of information through e-mail, posting to a user's workspace, SMS messages to mobile phones, delivery of information to an ordinary phone, and even delivery through fax or surface mail if necessary.

3.1.4 Content Management

All parties in the learning ecosystem will need to create, publish, and manage their own Web content by means of familiar tools such as Web browsers and office productivity suites. They will require easy-to-use tools that enable them to create and publish rich, personalized content directly to Web sites. A content management system will provide the tools to minimize publishing time in order to spend more time fostering learning in the learning ecosystem.

3.1.5 School Business Intelligence Services

The school business intelligence services are consumers of the data stored in the various school information systems. Through automated analysis techniques, these services generate reports on various aspects of student, teacher, and school performance. School business intelligence services enable the various stakeholders to have the necessary information to make informed decisions. Furthermore, the school business intelligence services are consumed by the various education spaces used by teachers, students, parents, and administrators - making it easy for the various stakeholders to identify an issue, take action, and then measure the impact of that action.

These building blocks create the framework for an effective and comprehensive learning system, the Connected Learning Community in which students, teachers, parents, and administrators benefit from the flexibility and connectedness of anywhere, anytime learning.

3.2 Scenario for the Connected Student

The connected student is the focal point of the Connected Learning Community. The connected student has access to a powerful learning space which enables them to analyze, critique, observe, synthesize, and express–whether online or on the go. While the richest learning experience (including mobile and/or disconnected use) is provided by a smart client device, learning experiences are available through alternate clients including "thin client" edge devices, Web browsers, and alternate devices such as mobile phones and personal digital assistants. Through these various client devices, they have access to their friends and classmates, to their family, and to powerful software tools to help them in their learning endeavors.

The connected student has access from:

- Personal learning devices (online or offline)
- Public access terminals/workstations
- School
- Libraries

The connected student has access to:

- Their files
- Their teachers
- Their peers
- Rich content libraries
- Tools that let them express their ideas creatively
- Tools that help them better manage their time
- Tools that help them work and learn as part of teams
- Tools that help them analyze the world around them

- Accessing Information, Experts and Teammates from Multiple Devices
Students without access to a personal learning device can use any of the simple terminal-type devices. After authenticating (by supplying a username/password pair, a smartcard, or a biometric method such as fingerprint or voiceprint), they have access to all of their information and learning tools. For example, they get fast and timely feedback from their teacher on their latest homework assignment, and see that their mother has already seen the great work they have done and has already weighed in with a note of encouragement. They see that their teammates are waiting for their approval of the final report, but they have a question about one detail. Seeing that three of the four are online, they quickly have a "virtual meeting" and resolve the issue. They submit their final report.

- Managing and Coordinating Schedules
Students in the connected learning community can effectively manage their time. Homework due dates, exam dates, and other school-related activities are automatically overlaid onto their personal calendars. Through shared calendaring, they can easily schedule online or face-to-face meetings with their peers or teachers. The student's personal calendar can aggregate calendar and event-related information from a variety of sources and display it in one aggregated view so they can easily see their entire day in one place. School information is stored in the school's calendaring system, and personal activities are stored in a consumer calendaring application. Through federation and trust relationships, and exposing calendar and event information in a common open format, a single unified view of a student's entire day can be provided.

- Coordinating Among Information Systems When On-The-Go
Many students in the Connected Learning Community will have access to personal learning devices. As they leave the school's wireless LAN, their system makes sure that they have all of the relevant information and resources synchronized to their learning device so that when they are home and have limited connectivity, they can continue to read, explore, research, and analyze while offline. When they return to the school the following day, their device automatically submits their completed work and synchronizes with the rest of the system, instantly re-linking them to their fellow students.

- Conducting Research
Researching an assignment or project is made easier. Students can search for reference material in a digital library. When researching topics where new information is made available often (such as current political activities), instead of having to redo their searches and determine what new information is available on a regular basis, students can subscribe to the results of their search and, using the notifications and messaging infrastructure, be informed of new information as it becomes available. As students copy information into their virtual research pad, source information for that information is also

stored so that when they are preparing their final reports, all sources are automatically cited and a complete bibliography is provided. Students also have access to tools to help them plan and manage learning activities, such as a research organizer tool to help them develop a research plan for a term project. The plan's major milestones are even added to the student's calendar.

- Collaborating
Using team meeting spaces, shared calendaring, and contextual presence awareness along with workflow automation in conjunction with the notifications engine, students can work together even though separated by time or distance. They can be proactively informed if their input is needed or if something has changed in the project, or can easily arrange to have a face-to-face meeting to work together. For example, if a student is working on a history assignment, presence information for other students taking the history course is available, but if working on a group science assignment, only the presence information for those peers in the workgroup is exposed.

- Expressing Ideas
In the Connected Learning Community, students can easily express their ideas in new and exciting ways using powerful data presentation software and creativity suites to create presentations, movies, and synchronized multimedia presentations. These presentations can be presented "live" and archived, as a part of their personal learning portfolio, for subsequent reflection on or use by themselves, their parents, or their teachers. Rich tools and resources with many new digital sources of information, students can explore their creativity and elevate this to new levels. Low cost and easily accessible tools like multimedia and speech engines allow easy expression for all students at all economic levels.

3.3 Scenario for the Connected Teacher

The connected teacher is the conductor of the Connected Learning Community. Their personal teaching and learning space is also accessible from a multitude of devices including Web browsers and "thin client" edge devices for nomadic use, with the richest experience occurring at their portable, intelligent teaching and learning device.

The connected teacher is connected to:

- **Their peers**
  - At their school
  - At other schools in their region
  - At other schools in their state
  - Around the world
- **Their students**
  - Through rich, timely data
  - Through information about their performance
  - Through the students learning portfolio
  - Through real-time communication (either face to face or online)
  - Through asynchronous communications
- **Their students' families**
  - By easily providing families information about
    - Student activities
    - Student performance
    - School activities
  - By being more accessible through online/virtual meetings and conferences
  - By being able to communicate directly with the family

- Grading
Like the connected student, the connected teacher's space benefits from the same underlying resources in the services fabric. For example, their student record book is connected through the school data interoperability fabric to the student information system making end-of-term grade reporting a simple process. That same student record book is tied to the performance monitoring infrastructure, so that in analyzing an individual student's performance, granular assignment-level data can be used.

- Keeping Multiple Parties Informed
Teachers also benefit from the shared calendaring system. They know that when they create an assignment in the learning management system, it will automatically be visible on their own and on each student's calendar. Any changes to the assignment are reflected immediately in each individual's assignment list. Furthermore, arranging parent-teacher conferences to discuss a particular student's progress is facilitated by parents being able to see available times for the teacher and vice versa. By

making their presence status available to parents or students, teachers can host online office hours or teacher conferences to assure that all stakeholders are guaranteed access.

- Curriculum Planning and Preparation

The connected teacher also uses powerful learning and curriculum management tools to manage classroom and online instruction, enabling them to easily tailor instruction to the special needs of a particular student and more easily track their progress through the performance management infrastructure. To facilitate their teaching activities, teachers have access to a rich library of digital curriculum objects, each correlated with particular educational objectives and curriculum standards. Using standard taxonomy and meta-data to describe these learning objects makes it easy to reuse these learning objects in different ways and in any compliant learning management or performance management system. The ability of teachers to rate the quality of these learning objects, report on their own applications, and report on the results of using these learning objects, combined with the rich communication and collaboration capabilities in the Connected Learning Community services fabric, enables the creation of rich "communities of practice" centered around the teaching context. This facilitates a seamless interweaving of professional development into everyday teaching activities.

Teacher Learning and School Improvement

The connected teacher experience is predicated on the belief that *teacher learning* is essential for *successful school improvement* and *improved outcomes for students*. Integral to teacher learning is *knowledge building* and *knowledge sharing*.

When considering the integration of technology in curriculum, we are guided by the work of Michael Fullan, who, in discussing technology as one of the crucial *external* factors forcing change in schools today, suggests that:

> the more powerful that technology becomes, the more indispensable good teachers are. Technology generates a glut of information, but is not particularly pedagogically wise. This is especially true of new breakthroughs in cognitive science about how learners must construct their own meaning for deep understanding to occur. This means that teachers must become the pedagogical design experts, using the power of technology—something they are not yet prepared to do, but is part of the getting out there story. (Fullan, 1998, 8)

For teachers to become *pedagogical design experts* using the power of technology, they need access to best practice examples of technology integration in a context similar to the *center of enquiry* model proposed by Schaefer in 1967. In this model, schools move from places that distribute knowledge to places that produce knowledge. Schaefer provides three reasons why schools should become centers of enquiry:

- good teaching requires that teachers reflect on their practice, teachers must *become researchers of their practice and inquirers into their profession*;
- such a change would *keep teachers alive intellectually*;
- if our aim is for students to become lifelong learners we must provide the same opportunities for teachers (Schaefer in Sergiovanni, 1996, 152)

Through Virtual Classroom Visitations, enabled by the capabilities in the communication and collaboration fabric, particularly the ability for video conferencing, teachers can reflect on and inquire into their profession alongside expert mentor teachers. They will produce knowledge of their own practice and share that knowledge with colleagues. The Virtual Classroom Visitations will build upon the understanding of the power of school visitations for knowledge sharing in teacher learning and school improvement as reported by Michael Fullan. Fullan suggests that "It is one of life's great ironies: schools are in the business of teaching and learning, yet they are terrible at learning from each other. If they ever discover how to do this, their future is assured." (Fullan, 2001, 92)

The development of online communities featured in the teacher spaces will enhance achievement of the goal asserted by Thomas Sergiovanni: "that if we expect schools to get continuously better at providing learning for students, teachers must become members of communities of practice and schools must become learning communities for adults as well students." (Sergiovanni, 1996 xvii)

Michael Fullan in his book *Leading in a Culture of Change* advises that school systems "would be well advised to name knowledge sharing as a core value." (Fullan, 2001, 105). The Connected Learning Community enables this.

3.4 Scenario for the Connected Parent

The connected parent can be seen as a facilitator in the connected learning community. They are connected to vital information about what is happening in school, not only through information related by their child, but by connecting directly with the school. The connected parent can access information about all of their children by accessing a single Web site from a computer at home, at work, through a WAP-enabled mobile, or even to a subset of the information through a phone-enabled interface to their personal space. Important information such as school-related events can be viewed in an aggregated fashion with their personal schedule information.

The connected parent has access:

- From a computer at home
- From a computer at work
- To some data from WAP-enabled devices
- To urgent information (injury, illness, truancy), through the device of their choosing
- From an ordinary telephone using a PID and call-tree

The connected parent can

- See what their child is doing in school
- See how their child is doing in school
- Schedule time to meet with teachers
- Communicate with teachers easily
- See teachers' feedback
  Learn how to help their child learn specific subject matter (through on-line resources)
  Purchase items and services from a school-vetted list to help their child succeed
- School could receive a portion of the sales proceeds
  Stay informed about school activities by participating in "school community"-type meetings with administrators (live, online, or on-demand after the event).
- Learn how their local school is performing relative to other schools

- Keeping Abreast of Activities

Parents can monitor their child's progress, and if concerns arise, they can take action by easily scheduling a meeting with the teachers, working directly with their child on particular tasks, or even purchasing additional resources or services such as an online tutor through the school's electronic marketplace. Access to students' and teachers' calendars, and to the school event calendar, along with presence information allows parents to be more engaged with their children and their children's teachers. Child status is easy to see and parents are actively notified on any specific issues as they occur, such as work progress, absenteeism, accident reports, and award notifications. All notifications are accessible across a range of services from online alerts to phone-based SMS alerts.

- Staying In-Tune with Child's Learning Process

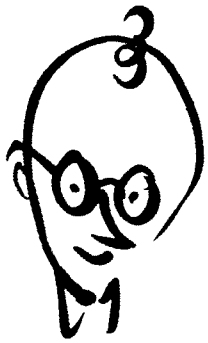
Parents can review summary data on their child provided through the business intelligence layer, drill into a specific assignment and see their child's work teachers' feedback, and be able to participate in "school community" type meetings with school administrators either face to face, online, or later on-demand.

- Providing Learning Resources

Parents can purchase school supplies, sell used school items, and purchase tickets to school-related events online through the school's electronic marketplace, comfortable in the knowledge that not only are they getting competitive pricing, but that a small percentage of the proceeds could go directly towards supporting the school's initiatives.

3.5 Scenario for the Connected Administrator

The connected administrator is the CEO in the connected learning community. The connected administrator rests well at night knowing that their teachers do not have to waste valuable time doing administrative or clerical tasks and can focus on their teaching and furthering their own learning through sustained professional development activities. They are confident that quality teachers want to teach at their school, thereby eliminating the challenges of attracting and retaining quality faculty.



The connected administrator is connected to:

- **The community**
  - Easily addressing the community through the Web
  - Soliciting community input through the Web, e-mail, phones, surveys, etc.
  - By enabling the community to know about important meetings through a shared community calendar
  - Making meetings open to people independent of location
- **Their staff**
  - Through improved performance monitoring systems
  - Through the ability to address and solicit feedback from teachers through the web, e-mail, phones, surveys, etc. without taking away from valuable face-to-face time with students and parents
- **Their peers**
  - By sharing best practices
  - Being able to discuss common issues (and resolutions)
  - Have access to a peer mentor
- **Government Agencies**
  - By more easily sharing data directly with oversight groups
  - Having access to legitimate performance information
  - Being able to more easily manage their budgets and school resources

- Staying In-Tune and Communicating with Constituencies

The connected administrator can easily keep a finger on the pulse of learning in their schools. The connected administrator can, with a few mouse clicks, schedule an online community meeting or allow the wider community to experience an open address or other more formal occasions. By using an inexpensive video camera attached to an ordinary computer, and leveraging the rich communications and collaboration service fabric, the administrator can make it available online or on-demand to keep community stakeholders informed and engaged with the schools.

- Keeping A Pulse on Key Developments and Overall Learning Progress

Administrators can ask the system to inform them proactively through the notifications infrastructure if certain conditions arise, thereby enabling them to take action before circumstances get out of hand. The business intelligence component of the foundation services provides administrators with up-to-date information about how students are progressing in their school. They have the ability to generate their own reports on particular items of interest without having to rely on a database administrator or systems programmer.

3.6 Design Objectives

The Microsoft vision for education delivers opportunities to equip students, teachers, parents, administrators, and the surrounding community with the environment required to meet their individual needs. Microsoft views the delivery of this vision in terms of a framework that can flexibly evolve over time. The design objectives of this framework aim to address both today's challenges and those of the future through evolving Microsoft solutions and products that address the specific needs of the ecosystem. The following table illustrates technology design objectives, the scenarios made possible by addressing them, and example enabling technologies that can make such scenarios possible in meeting the design objectives.

Design Objectives	Desired Scenarios	Technology / Product
Professional Development	• Through the development of course material, teachers need to make good use of basic tools like word processing, spreadsheets, scheduling, presentations, etc. • Some teachers need to instruct in information technology where some levels of certification are required • Career development programs for teachers	• Microsoft® Office System • Microsoft Windows® XP • Microsoft Certified Professional (MCP) certification • Microsoft Office Specialist Program
Learning Processes	• Guided access to resources: individualized, self-directed learning, online learning, and mobile services • Tools for teaching with immediate, ongoing assessment; streamline administrative tasks resulting in more time to spend teaching • Facilitate more personalized, relevant, and efficient learning, allowing more time to target students' preferred learning styles and unique areas of interest • Use real-time feedback and assessment to identify students' problem areas in time to motivate and correct	• Microsoft Class Server • Microsoft Exchange Server • Microsoft SQL Server • Microsoft Office System • Microsoft SharePoint™ Portal Server • Microsoft Windows® SharePoint Services • Microsoft Windows XP • Microsoft Windows Media™ Services • Microsoft Mobile™ Software
Commerce	• Online fees payments • Online shopping (uniforms, books, and stationery)	• Microsoft Commerce Server • SQL Server
Building Blocks		
School Data Interoperability	• Student registrations process; share data from agencies and other schools • Data sharing between administration systems • Minimize administrative time while maximizing teaching and research time • Online incident reporting to police and justice departments • Communicate directly, rapidly, and more frequently with stakeholders	• Microsoft BizTalk® Server • Exchange Server • SQL Server • Microsoft Office System
Technology Standards	• Schools need a flexible infrastructure that fits their unique needs • Infrastructure based on open technology standards such as XML and Web-based services communicating over the HTTP protocol • Loosely coupled systems to function as one • Mission-critical information housed in secure data centers which are centrally supported, and various services are provided through application service providers according to service level agreements	• Microsoft Visual Studio® .NET • Microsoft .NET Framework • Industry-recognized, open, platform-independent standards such as XML (Extensible Markup Language), SOAP (Simple Object Access Protocol), SIF (School Interoperability Framework) and IMS (Instructional Management Systems Global Learning Consortium
Communication & Collaboration	• Parent/teacher online discussion on student outcomes/progress • Student/teacher online discussion with tutors and experts on focused areas of course material • Student-to-student collaborations and chat on projects • Parent access to student and school schedules, calendars, and current scores • Students can communicate and collaborate easily using presence-aware technology to brainstorm and aggregate ideas • Increased collaboration and sharing best practices across school campus and between schools over wide geographic boundaries	• Exchange Server • SQL Server • Microsoft Office System • SharePoint Portal Server • Windows SharePoint Services • Windows XP • Windows Media Services • Microsoft Mobile Software
Content Management	• Student can gather relevant learning resources effortlessly for analysis and presentation when, where, and how they prefer—at home, school, or play • Teachers can spend less time preparing information for rich, dynamic display and more time learning • Teachers can explore alternative technology-enabled pedagogies encouraging student-facilitated discovery and collaborative mentoring	• Class Server • SharePoint Portal Server • SQL Server • Windows Media Services • Windows XP
School Business Intelligence Services	• Administrators can generate reports on various aspects of student, teacher, and school performance • Oversight groups can have the necessary information to make informed decisions • Information made available to various parties including teachers, students, parents, and administrators - making it easy to identify issues, take actions, and then measure the impact of those actions	• Class Server • SharePoint Portal Server • SQL Server • Microsoft Data Analyzer • Windows Media Services • Microsoft Content Management Server • Microsoft Office System

4 A Vision for Education

An effective and comprehensive learning ecosystem delivers tools for learning, focusing on the role of technology as an enabler rather than on the technology itself. As teaching is refocused to learning, this ecosystem must be in place to facilitate individuality in place of traditional educational processes. This learning ecosystem is flexible, adapting to new innovations in teaching, learning, and technology.

Microsoft can help schools overcome social, economic and technology challenges and improve the learning ecosystem. Microsoft's support of anytime, anywhere learning is part of the company's continuing efforts to help create a global Connected Learning Community in which all students and educators have access to tools and information to support learning today and for a lifetime.

This learning ecosystem *is* the Connected Learning Community, a community of learning for teachers, parents, students, and administrators.

4.1 Learn More About the Connected Learning Community Approach

Schools can take immediate steps towards building a connected learning environment. They can begin by referencing Microsoft's planning document, "A Practical Guide to an Effective Learning Ecosystem".

Additionally, Microsoft provides a wide range of planning advice and guidance resources to help schools plan for and achieve a Connected Learning Community.

Additional Resources for Improving the Learning Ecosystem
Technology Planning: the Good the Bad and the Ugly, a planning case study at www.microsoft.com/education/?ID=PlanTMM
The **Microsoft Connected Learning Community Technology Roadmap** shows you how to get to your destination, a connected learning environment in which teachers, students and staff have access to productivity tools and advanced network technology: www.microsoft.com/education/?ID=Roadmap
Technet provides technical planning and resources at www.microsoft.com/technet/treeview/default.asp?url=/technet/ittasks/plan/default.asp
The **PD Alliance program** brings together companies and organizations that offer professional development services or courseware on Microsoft solutions and provides an easy way for educators to locate high quality services and solutions: www.microsoft.com/education/?ID=pdalliance
Accountability and assessment tools help you provide the right information to the right people at the right time, enabling educators to make better decisions and improve learning: www.microsoft.com/education/?ID=AccountAssess
Interoperability helps you maximize your IT investment, unlock information kept in stand-alone databases, streamline data flows and administrative processes and provide Web-enabled services that meet users' individual needs:.www.microsoft.com/education/?ID=EAI

To learn more about achieving an effective learning ecosystem, go to www.microsoft.com/education, or contact your local Microsoft or Microsoft partner representative.

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The information contained in this document represents the current view of Microsoft Corporation on the issues discussed as of the date of publication. Because Microsoft must respond to changing market conditions, it should not be interpreted to be a commitment on the part of Microsoft, and Microsoft cannot guarantee the accuracy of any information presented after the date of publication.

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Oklahoma Schools Meet "No Child Left Behind" Act Reporting Requirements with Microsoft Portal, Accountability, and Assessment Solution

Published: April 2003

The federal "No Child Left Behind" act places substantial new requirements on educators to track and report numerous educational performance metrics, manage curricula and demonstrate annual improvement in student achievement. In Oklahoma, 10 school districts have deployed a solution that enables them to meet these legislative demands and more. Microsoft's Portal, Accountability, and Assessment solution is at the core of the state's Oklahoma VISION project to deliver innovative curricula over the Web. The end-to-end solution incorporates a data warehouse with rich analytical, data mining, and presentation capabilities. This is coupled with online course delivery, curriculum management and assessment tools provided by Microsoft Class Server. The result is automated data collection for meeting federal reporting requirements while enabling data driven analysis to support a scientific, decision making process and a closed loop system for continuous improvement.

Challenge

The federal No Child Left Behind (NCLB) act represents a major policy initiative for American education. Student achievement will be judged at the school, district and state level. Those accountable for students' academic achievement could have their funding tied to how students perform in comparison to their peers nationwide. Students must be assessed on academic performance and schools, districts and states will be judged on the achievement of their students.

"The law requires us to assess 95 percent of our students," says Joe Kitchens, Superintendent of Western Heights (Oklahoma) Public Schools. "And that's not just 95 percent of all students, but 95 percent of students at the district, school, grade, and class levels. And we have to measure not just individual performance, but also performance relative to ethnicity, gender, special needs, English as a

Solutions Overview

Partner Profile

Thirteen school districts in Oklahoma are leading the Oklahoma VISION project, an initiative to explore the advantages of Web-based instructional programs.

"The Microsoft-based solution gives us the ability to communicate, to collaborate, to offer the most appropriate instruction to our students based on how they learn and when they learn. This is the key to implementing NCLB—and the key to unleashing a new era in education."

-Joe Kitchens
Superintendent
Western Heights
School District

second language, and other groups. To meet these requirements, we have to collect huge amounts of data that we never tracked before. Then, we have to be able to access and analyze that data and set up remediation plans to boost student performance. It's a tremendous data management issue."

The 500 school districts in Oklahoma, with some 600,000 students, have an edge in meeting the data management needs of NCLB. In 2001, the Oklahoma Legislature laid the groundwork and provided the funding for the establishment of the Virtual Internet School in Oklahoma Network (VISION) project. To assist in the design, development and implementation of the VISION Project, Oklahoma sought assistance from leading corporations in the technology industry including Dell, Intel and Microsoft Corp. JES & Co., a nonprofit organization that serves education agencies, has played a critical role in coordinating Oklahoma's efforts. The project, designed to develop and deliver Web-based curriculum to all Oklahoma students, is being piloted in 10 districts throughout the state.

Related Links

Microsoft Class Server
http://www.microsoft.com/education/?ID=ClassServer

Western Heights Public Schools
http://www.westernheights.k12.ok.us/

Solution

Oklahoma has been implementing VISION with an Intel solution architecture called the "Managed Learning System," centered on the Microsoft Portal, Accountability, and Assessment solution. The solution simplifies the integration of district information into a centralized SQL Server data warehouse. The data warehouse supports district and state reporting needs and provides analysis capabilities used to drive recommendations for improving student achievement based on numerous data points collected from student systems.

A key component of the system is Microsoft Class Server, the Web-based K-12 learning management and assessment delivery platform. Class Server integrates to the data warehouse and enables online curriculum management, course delivery, and assessments. With data warehouse integration, Class Server information is readily correlated with actual measures of student achievement. Oklahoma schools can track the long term effectiveness of changes to curriculum, resources and teaching methodologies for individuals or any subgroup.

Analysis and reporting can be done by administrators using familiar tools and interfaces within the existing Microsoft Office environment. Information for students and parents at home or for the community is easily and securely shared through the Web.

The solution infrastructure is deployed using eight Dell single processor servers running Microsoft Windows® 2000 Advanced Server with Internet Information Services (IIS) 5.0, Microsoft Exchange Server 2000, Windows Media Server, Microsoft SQL Server™ 2000, and Microsoft Active Directory® service.

NCLB has two basic aspects: measuring student achievement and remediation to improve that performance. With VISION focused on the creation and delivery of innovative curricula that addresses the second goal, it was crucial for Oklahoma to develop ways to address the first goal—measuring student performance—and, especially, to tie the two together, so that assessments of student performance under NCLB could drive the curricula that would enhance that achievement.

Using XML Web Services to Integrate Databases

To achieve this integration and synergy, Oklahoma expanded its Class Server-based infrastructure by integrating it with the student information systems (SIS) that record student performance on standardized tests. Intel Solution Services has provided architectural design and project management for this effort, creating a managed learning system that uses XML Web services created with the Microsoft .NET Framework to pool data from the SIS SQL Server database and Class Server SQL database into a unified data warehouse. SQL Server analysis services provide the intelligence to analyze student performance in the variety of ways required by NCLB, and to deliver the data via reporting tools.

"You can't meet the NCLB paradigm without being able to combine the assets of a good SIS with a great instructional management program, such as Class Server," says Kitchens. "The SIS data enables you to identify the needs. Then the instructional program enables you to intervene with individual students, sub-groups, classes, or entire grade levels, as appropriate."

In-Depth Analysis Now Possible

The ability to integrate SIS data, e.g., performance on state standards testing, with Class Server data on student performance in the classroom on those same standards, gives teachers and administrators a level of in-depth analysis not possible before.

"We're no longer looking just at performance on state standards, but also at what teachers are finding when they assess students on those same standards in the classroom," says Kitchens. "That gives us a more complete and detailed understanding of student performance. And because the data is updated daily, we not only have access to more data than ever before, we also have access to completely up to date data, so we're getting a complete and accurate picture."

Access to reports is guided by Group Policies based on Active Directory. Teachers can see individual student performance scores for students in their classes, but not for individual students in other classes. Similarly, principals can see individual results for students in their own schools, but not for students in other schools. Meanwhile, aggregated data—at the class, grade and school level—is more broadly available to teachers and principals. Students can access their own performance data. Parents—logging in remotely over the Internet—can access the results of their children, as well.

The data-based reports, meanwhile, drive teachers' decision-making about curricula for their classes and for individual students in those classes.

"Once the needs are established, Class Server enables teachers to make assignments for individuals, groups, and entire classes," says Kitchens. "Then, the results of student performance on those curricula feed back into the system and enable teachers to further guide the instructional process. We are on the way to achieving a complete loop of assessment, analysis, and remediation."

Benefits

Enables Realization of NCLB Goals, Requirements

The enhanced version of the VISION project is enabling Oklahoma to take a leadership role in meeting the requirements and implementing the goals of NCLB.

"Thanks to Microsoft Class Server and technical implementation from Intel, we have finalized the integration engine framework that provides the access to appropriate data for implementing NCLB," says Oklahoma State Representative Abe Deutschendorf, who has been working to implement VISION at the state level for four years. "I believe VISION is the first and final solution in the implementation of NCLB."

Teachers Gain Power to Boost Effectiveness of Instruction

The enhanced VISION project greatly increases the ability of teachers to boost the effectiveness of instruction, according to Kathy Elliott, a Durant (Oklahoma) Public Schools teacher of 23 years who is now assigned full-time to implementing VISION and training her colleagues to use Class Server.

"Typically, if a teacher wanted test information on a student, she had to go to a file cabinet and it was a monumental task to pull together the prescriptive information needed to make decisions about curriculum," says Elliott. "Looking at the student's performance in comparison to disaggregated groups was such a huge chore that it didn't get done. But Microsoft Class Server pulls all of this together for us.

The way we can drill down into the data is amazing to me—the possibilities are limitless. With a few mouse clicks, Class Server organizes this information so it's easy for the teacher to analyze it, access appropriate lesson plans, modify them as needed, and assign them to the student."

An integral, but often overlooked, aspect of boosting student performance is to provide information that helps teachers become better teachers. According to Elliott, Accountability and Assessment solutions based on Microsoft software do that as well. "The information we can access is dynamic and real time," she says. "We can look at the performance of an individual, group, or class on a specific lesson plan. If the entire class underperforms on the lesson, the teacher knows to change the lesson or the way it's taught. This will really help us to better teach for understanding."

Teachers also gain the ability to share lesson plans and to collaborate on their creation. Elliott says she's impressed with the creativity that teachers employ—and that Class Server enables them to capture—to boost the effectiveness of lesson plans. For example, to teach geometry, one teacher developed interactive animations in which a crop duster plane flew over Oklahoma farmland with fields cut into the shapes of circles, trapezoids, and so on.

"The Microsoft-based solution gives us the ability to communicate, to collaborate, to understand better than ever before how well our students are learning, and then to offer the most appropriate instruction to them based on how they learn and when they learn," says Kitchens. "This is the key to implementing NCLB—and the key to unleashing a new era in education."

For More Information

For more information about Microsoft products or services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada information Centre at (800) 563-9048. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information via the World Wide Web, go to: http://www.microsoft.com/education

Microsoft

BELLEVUE SCHOOL DISTRICT

Open Standards reduces NCLB and technology implementation costs for Bellevue School District

Dr Mike Riley Superintendent of the Bellevue school district knows what makes the difference between an average educational experience and an exceptional educational experience

As the Superintendent for a 15,000 student school district Dr Riley was looking for a way to maximize information technology to enhance both the teaching and learning experience while capturing information that could be used to measure and quantify results. He believed that implementing a unified IT infrastructure would enable the district to use information as a strategic enabler bringing Teachers, Administrators, Students and Parents closer together and more proactively involved in the educational process.

To meet this goal the district choose to partner with Dell, Microsoft and Zone Integration Group to implement a solution that tied together the districts standalone applications, develop enhanced reporting capabilities, provide new web based teaching and learning tools and to tie this all together through a web based portal.

The answer was a combination of HW and SW solutions from Dell and Microsoft. Zone Integration Group was contracted to provide the integration services. The first order of business was to upgrade the existing infrastructure with the addition of new Dell PowerEdge rack mounted servers and the implementation of a storage area network (SAN) solution to provide centralized storage, fault tolerance and manageability of district wide data.

This was followed with the implementation of a Zone Integration Server (ZIS) and Schools Interoperability Framework (SIF) data repository for the sharing and synchronization of data between the districts core applications. The Zone Integration Server is based on Microsoft's BizTalk Server for the business logic and employs SQL for the data repository. To maximize the value of the data now being consolidated in the ZIS data repository Zone Integration developed a data warehouse using Microsoft's SQL Server to provide a method to easily and quickly deliver consolidated, customized reporting across the districts core applications.

Phase two was the implementation of Microsoft's Class server. Class server provides school districts a platform for collaborating, sharing, designing and the administration of teaching and learning resources. Class Server provides productivity tools that significantly enhance the teachers and districts ability to develop administer and evaluate curriculum and student outcomes.

Finally the new services and tools were tied together through Microsoft's SharePoint Portal Server. SharePoint provides a highly customizable point of entry for sharing information and resources with Teachers, Administrators, Students and Parents. Through log-in profiles each constituent group will be presented with a unique user interface and the ability to retrieve and view pertinent data for their respective needs. All of this using open web standards and available any time any place from any internet enabled device.

Through the use of Open Standards and web based tools Bellevue has transformed their information technology from a hodge-podge of standalone applications to an integrated information platform providing world class educational experiences now and into the future.

To find out more about how you can take advantage of the

Contact:

SUMMARY

The Enterprise

Bellevue School District
Bellevue Washington

Bellevue School District is a 15,000 Student School District located just East of Seattle. Several years ago Bellevue moved away from being a full service IT organization and began implementing third party point solutions to address the districts core software needs. While this significantly reduced operational costs over the short term the district was left with silos of information. As the demands for more accurate and timely information have grown extracting and leveraging information across these platforms has become increasingly difficult and expensive. Recent legislative changes have also made the ability to make data driven decisions of paramount importance.

The Challenge

Maximize the use of Information Technology as a strategic tool to enhance the teaching and learning experience. The districts IT infrastructure was a collection of applications that served the functional needs of the various departments. Sharing information between these various point applications was mostly manual or non-existent. The results were redundant data entry, poor data quality and a time consuming and tedious process to collect and report on critical information. The goal was to tie these solutions into a unified data system providing key information to Teachers, Administrators, Students and Parents on a real time basis.

The Solution

Integrate the various third party applications using the Schools Interoperability Framework (SIF) and a Zone Integration Server. A data warehouse providing robust reporting capabilities from the newly aggregated data. Class Server productivity tools for teachers and students. SharePoint Portal Server enabling collaboration, information delivery and a consolidated user interface across the Enterprise.

The Results

Data is now shared and aggregated across core applications without their replacement. Data integrity is greatly enhanced through a single point of entry. Robust reporting capabilities exist across the district and are available through the portal. Teachers now have new productivity tools for developing and delivering curriculum. Parents and Students now have on-line access to pertinent and timely information. A unified User interface provides single log on access to information across the district. An open standards platform that is scalable into the future.

KEY FEATURES AND BENEFITS

Based on Open Standards

SIF data exchange is based on XML, an open web standard. Through the implementation of the SIF standard applications can be integrated together without costly replacement. No more redundant data entry and enhanced data integrity.

reduces administration cost.

Web based applications provide parents and Students with access

Fast and Easy to
Implement
Low Cost of Ownership
Secure

"Customers are amazed -- I had the same impression the first time I saw."

Microsoft

achieve

Accountability and Assessment Solutions: Report. Analyze. Improve.

With the No Child Left Behind Act (NCLB), schools, districts and states are under increasing pressure to demonstrate student achievement and improve instructional approaches. To help school systems meet this demand for accountability, Microsoft offers solutions for Accountability and Assessment. These solutions enable schools and districts to accurately report progress in accordance with NCLB requirements, analyze critical information to identify proven approaches, and act to improve student performance.

Solutions Highlights

Integrated: solutions leverage existing assets and information to simplify data sharing, work flow and integration across different systems.

Flexible: solutions are built to be flexible and extensible to meet unforeseen needs and opportunities.

Easy-to-use: solutions integrate with the Microsoft® Office System, decreasing training time and improving accessibility.

Cost-effective: short development time and rapid deployment with widely used business intelligence components result in quick Return On Investment (ROI).

Meeting requirements of the NCLB Act is critical, making accurate and timely reporting a top priority in education. States, districts and schools must administer tests and generate reports on standards, curriculum, instructional approaches and progress, and make this data widely available to others. School systems that show inadequate academic progress or fail to meet requirements will suffer consequences such as corrective actions and student transfers.

With Accountability and Assessment solutions from Microsoft, you can easily and cost-effectively meet these reporting requirements, and provide a closed-loop system to drive better decision making for curriculum and other factors affecting school performance. Unlike alternatives, your solution enables you to analyze factors that impact learning, and take action to help improve student achievement.

Easily Meet NCLB Reporting Requirements

Based on business intelligence tools developed by Microsoft, the solutions allow you to compile and integrate data from multiple systems for more precise reporting. Generating timely and accurate reports enables you to demonstrate that you're meeting NCLB requirements. The ability to create reports from a wide variety of data sources also enables you to measure your progress towards meeting goals, document improvement, and share appropriate information with district, community and state education agencies.

Microsoft Accountability and Assessment solutions give you new flexibility in using reports. You can break down reports into all required NCLB reporting categories such as economic and migrant status. In addition, you can easily establish new categories as needed or requested from school, district and state decision makers.

You gain new reporting capabilities, as well. For example, you can compare results from different perspectives to determine your district's learning needs, including results over time, across different student groups, and even the effectiveness of curriculums.

With Accountability and Assessment solutions, schools can address NCLB guidelines by:

- Generating reports based on required NCLB subgroups like gender and disability.
- Creating a variety of additional reports as needed.
- Providing essential accountability results for district, community and state education agencies.
- Measuring progress towards student achievement and other district goals.

Use Data-Driven Analysis to Evaluate Progress

Reports help you identify trends. Data analysis enables you to determine the factors that cause those trends. With this information, it becomes possible for you to positively impact education by identifying root causes of performance. Accountability and Assessment solutions provide a data-driven approach to analyzing the effectiveness of changes in the learning environment.

With powerful analysis tools, you can combine data from multiple systems, analyze achievement over time, and measure the effectiveness of curriculum. This results in better information to drive decisions on curriculum and other factors that impact learning.

Microsoft solutions enable all decision makers to quickly and easily access the data necessary for making informed decisions at the district, school, classroom and even student level.

By using familiar tools from the Microsoft Office System, data can be presented in a variety of ways, from pivot tables to graphs, for easier analysis by more users. By comparing data for specific schools, classes or student groups, you can determine if any groups are falling behind. Beyond that, you can identify root causes and ways to turn the situation around. You can also identify effective curriculums for use elsewhere in the district.

With Accountability and Assessment solutions, schools can use data-driven analysis to evaluate progress by:

- Identifying district, school and classroom areas that need improvement.
- Discovering specific factors that affect student performance and how they relate to different types of students.
- Determining the best instructional approaches and curriculums for replication.

Take Action to Improve Learning

Equipped with accurate data about student performance and powerful tools for analyzing that data, you can make appropriate changes to improve learning and meet achievement goals. Microsoft solutions also help you align the district curriculum to state standards by using proven instructional approaches and materials. With curriculums identified, solutions allow teachers to design and integrate appropriate lesson plans and track progress for real-time feedback for continuous evaluation.

Microsoft solutions integrate easily with your current technology, allowing you to use existing resources while increasing the curriculum and assessment tools available to teachers. They also utilize Web publishing and portals for online information sharing and access to learning materials.

In addition, you can be more responsive to changing assessment and curriculum needs with a closed-loop process. As daily assignments and tests are completed, results are cycled through the data warehouse, enabling you to map curriculum to results and track progress at any point in time. This process allows you to make continuous improvements that are tested and analyzed with data-driven results.

With Microsoft Accountability and Assessment solutions, schools can take action to improve learning by:

- Improving instructional approaches with accurate data-driven analysis.
- Integrating with, and building on, existing technology.
- Offering anywhere, any time access to learning resources.
- Continuing to improve by tracking performance on an ongoing basis.

Solution Elements

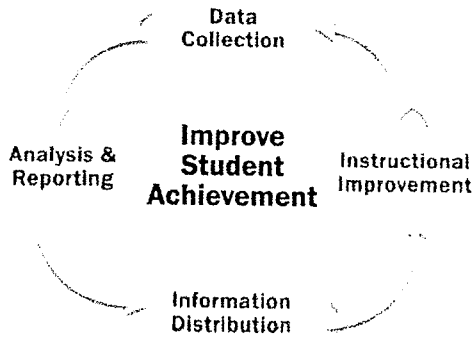
Microsoft and industry partners offer a complete, integrated set of products and services to enable comprehensive accountability and assessment solutions. The following solution elements can be used with Microsoft Accountability and Assessment Solutions for Education.

- **Data Warehousing**
- **Reporting and Analysis (OLAP)**
- **Curriculum Management**
- **Application Integration**
- **eLearning**
- **Web Portals**
- **Microsoft Office System**
- **Messaging and Collaboration**
- **Secure Connected Infrastructure**

Partner Products and Services

A wide variety of industry partner products and services are built on Microsoft's solutions, such as student information systems, eLearning, and assessment tools.

To learn more about the powerful education solutions available through Microsoft and partners, go to www.microsoft.com/education



Collect and consolidate data from multiple sources.

Analyze and Report to identify improvement areas, discover causes and meet NCLB requirements.

Distribute progress information to district, community and state education agencies.

Improve instructional approaches by implementing changes based on data-driven analysis.

Microsoft

Western Heights Public Schools Meet NCLB Requirements, Gain US$400,000 in Revenue

Overview

Country/Region: United States
Industry: Education

Customer Profile

The Western Heights Public Schools, located in Oklahoma City, Oklahoma, serves 3,100 students from six schools with a combined teaching staff of 240.

Business Situation

The district needed to meet NCLB reporting requirements to track student performance from grade to grade and to implement successful remediation programs based on formal assessments.

Solution

The district implemented a combination of Microsoft® Class Server 3.0 and Chancery Student Management System (SMS) version 4.3, which are both School Interoperability Framework (SIF)-compliant and communicate through an Intel Zone Information Server (ZIS).

Benefits

- Report time cut by 95 percent
- Instructional plans map to student registration
- Differentiated learning
- New revenues of US$400,000

"We adopted the Microsoft and Chancery solution to meet NCLB requirements and improve student education. That we can do this and see major new revenues at the same time—that's tremendous."

Joe Kitchens, Superintendent, Western Heights Public Schools

The Western Heights (Oklahoma) Public Schools are using an integrated instructional management system and student information system solution to produce assessment reports that meet No Child Left Behind requirements and drive decision-making. The Microsoft Class Server 3.0 and Chancery Student Management System (SMS) solution—which is compliant with the Schools Interoperability Framework (SIF) and interoperating through an Intel Zone Information Server (ZIS)—allows teachers to evaluate student needs based on multi-year records of student assessment. Teachers also can create differentiated learning plans for groups of students within classes, supporting students at different learning levels. While the district adopted the solution to enhance education rather than to make money, it has enabled the district to gain US$400,000 in additional federal and state school revenues.

CHANCERY
STUDENT MANAGEMENT SOLUTIONS™

Microsoft®
Class Server
Learning Management Platform

"We need Class Server to work from up-to-date information in our student information system. Our ZIS and SIF-compliant solutions make this possible."

Joe Kitchens, Superintendent, Western Heights Public Schools

Situation

School districts around the country are working to meet the requirements of the federal No Child Left Behind (NCLB) Act. NCLB sets extensive requirements for assessing student performance and ties federal funding to student achievement. Western Heights Public Schools Superintendent Joe Kitchens is well versed in those requirements.

"The law requires us to assess 95 percent of our students," says Kitchens, "and that's not just 95 percent of all students, but 95 percent of students at the district, school, grade, and class levels. And we have to measure not just individual performance, but also performance relative to ethnicity, gender, special needs, English as a second language, and other groups. To meet these requirements, we have to collect huge amounts of data that we never tracked before."

Western Heights Public Schools is based in Oklahoma City, Oklahoma and serves 3,100 students in six schools with a combined faculty of 240.

But the data management issue is only part of the NCLB challenge for Western Heights and school districts around the country, says Kitchens. The other part of the challenge is analyzing the data and setting up remediation plans to boost student performance.

"Instructional management is really two issues," says Kitchens. "The assessment data is insufficient unless it ties directly to the ability to create instructional intervention programs, because that's the ultimate mission of a school district: to better the instructional experience for children."

That's the mission but, until recently, Western Heights faced a significant challenge in meeting it. The district was using two software solutions: Chancery SMS as its student information system (SIS) and Microsoft® Class Server, Web-based K-12 curriculum management and delivery software, as its instructional management solution. But the two applications did not interoperate, leading to a host of problems.

The smaller problem was that information on students had to be added separately to each solution. "If you entered a name into Class Server, you hoped that the name, grade level, and scheduling information was the same information going into the student information system—but there was no guarantee of that," says Kitchens.

The greater problem was that the lack of integration meant that information from the two solutions could not be used together. Because SIS data did not automatically populate Class Server, there could be significant lags between the time that changes in registration were implemented in the SIS and the time those changes were reflected in Class Server. This inhibited the ability of teachers to use Class Server for all of the children actually attending their classes. That's a significant issue in a district in which 30 percent of the students don't finish the year in the same class or school in which they began it.

Because the district's system kept student information in distinct, unintegrated data "silos," it was impossible for a teacher to review a student's performance over the course of several years and, thus, better understand the student's learning requirements. It was also impossible to meet the NCLB requirement to maintain a comprehensive record of student performance throughout the tenure in the district—potentially up to 14 years' worth of data. Because data had to be manually integrated from a variety of sources, more

than 20 people spent several weeks each year compiling the reports the district needed to meet federal and state requirements.

Solution

At the start of the 2003-2004 academic year, Western Heights migrated and upgraded its Chancery and Microsoft solutions. The district now runs Chancery SMS version 4.3—a Microsoft .NET Framework application and the first version of Chancery SMS to be certified as compliant with the Schools Interoperability Framework (SIF)—and Microsoft Class Server version 3.0. The solutions interoperate via a SIF-compliant Zone Integration Server (ZIS), the Intel Integration Engine. Both solutions run on the Microsoft Windows Server™ 2003 operating system.

Class Server runs on two Dell PowerEdge servers, a front-end application and Web server running the Internet Information Services 6.0 component of Windows Server 2003, and a back-end database server running Microsoft SQL Server™ 2000 Standard Edition. About 10GB of learning resources are stored on the Web server and about 200MB of student information is stored in the back-end database.

Chancery SMS runs on a similar two-server configuration, with a dedicated application server and Web server on the front end and a dedicated database server on the back end. Chancery SMS stores historical student data, enabling Western Heights to build a longitudinal record of students as they progress through the district year after year. Accordingly, the database is expected to grow at an estimated rate of 30 percent annually. To maximize the ability to conduct custom reporting and analysis, the solution uses SQL Server Reporting Services and a separate SQL Server data warehouse.

The use of the SIF-compliant solutions together with an Intel ZIS allows Western Heights to populate all relevant systems, including Class Server, with student information as soon as it is entered into the Chancery SMS. The single point-of-data-entry eliminates the need to populate each solution separately, ensures data accuracy and, most important, enables the district to use student registration data to drive state assessment information to the correct teacher and class, regardless of how recently the student changed classes or schools.

"We use Class Server to create our own assessments that tie to state assessments," says Kitchens. "To distribute those district assessments properly, to distribute instructional content properly, and to distribute reports so big that we can't afford to print them—such as the Stanford 9 assessments—we need Class Server to work from up-to-date information in our student information system. Our ZIS and SIF-compliant solutions make this possible."

Benefits

Fast, Powerful Reporting Meets NCLB Requirements

Western Heights now has the ability, for the first time, to maintain records on individual student achievement throughout a student's years in the district. This enables Western Heights to meet a key NCLB requirement for such reporting—but the benefits to the district only start with legislative compliance.

"Understanding when and how student performance issues began is crucial to addressing those issues with successful remediation," says Kitchens. "The Chancery and Microsoft solution, which tracks multi-year performance, gives us the depth of information our teachers need to understand student deficiencies and devise successful remediation strategies."

"Thanks to Chancery and Microsoft, we save 95 percent of the time and cost of reporting with our previous solution."

Joe Kitchens, Superintendent, Western Heights Public Schools

Administrators, meanwhile, are able to produce instructional performance reports at various levels—grade, school, and district—based on ethnicity, gender, socio-economic group, student learning style, and other factors. Thanks to SQL Server Reporting Services, they can drill down over multiple factors and use sophisticated filtering capabilities. The result is better decision making based on real-time information.

Reports are also produced far more quickly and cost-effectively than ever before. The annual statistical report that Western Heights prepares for the state of Oklahoma used to take 10 days to assemble. Now, Kitchens readies the report himself in a matter of seconds.

"Our state and federal reporting used to require 20 people at all levels of the organization rolling up data over the space of several months of intermittent effort," says Kitchens. "Now, one person manages the entire process in one week. Thanks to Chancery and Microsoft, we save 95 percent of the time and cost of reporting with our previous solution."

Enables Differentiated Education

Driving more effective assessment reports to teachers and administrators is one key benefit of the SIF-compliant Chancery and Microsoft solution. Changing what happens in the classroom in order to boost student performance is another.

"Every child has different interests and aptitudes, so every child learns in a different way and at a different pace," says Kitchens. "If you go into a classroom with 20 students, you'll have four or five—or sometimes even more—different learning groups. So we need an instructional management solution that not only lets us teach to our state standards, but that also allows teachers to create differentiated lesson plans for the various groups of learners in the class. Our integrated Class Server and student management solution gives teachers an excellent understanding of each child's abilities and aptitudes, and then enables the teacher to put together the resources for those differentiated lesson plans. You can't imagine how difficult this was to do by hand."

In addition to enabling differentiated learning, Class Server enhances the process of education at Western Heights by giving every teacher access to a tremendous inventory of learning resources, including best practices and lesson plans of other teachers, multimedia and Web-based content, video, graphics, and text. Class Server also enables Western Heights teachers to take advantage of the original learning content being created by teacher-developers throughout Oklahoma as part of that state's innovative VISION project.

Yields $400,000 in New Revenues

The district receives approximately US$5 million annually in federal funding from the free and reduced-price school lunch program. Because the district can now integrate student information system data with its SIF-compliant school lunch software through the ZIS, it can identify students for whom they are not receiving lunch funding—but who almost certainly qualify because they are the siblings of qualified students. This year, that increase in the district's count of economically disadvantaged students produced another 8 percent, $400,000, in revenues to the district.

"We didn't adopt this solution because we were going to save or make money," says Kitchens. "We adopted the Microsoft and Chancery solution to meet NCLB requirements and improve student education. That we can do this and see major new revenues at the same time—that's tremendous."

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to: www.microsoft.com

For more information about Chancery Software products and services, call (604) 294-1233 or visit the Web site at: www.chancery.com

For more information about Western Heights Public Schools, call (405) 350-3410 or visit the Web site at: www.westernheights.k12.ok.us

Microsoft Class Server

Microsoft Class Server 3.0 makes it easy for school districts to create, deliver, and grade standards-aligned tests and lessons over the Web—helping teachers track and improve student achievement against local curriculum standards, and meet the challenges of No Child Left Behind. For more information about Microsoft Class Server, go to: www.microsoft.com/classserver

Software and Services

- Microsoft Windows Server System
  - Microsoft Windows Server 2003 Standard Edition
  - Microsoft SQL Server 2000
  - Microsoft Class Server 3.0

Hardware

- Dell PowerEdge servers

Document published June 2004

Microsoft®

Wilkes-Barre Schools Meet NCLB Challenges, Enhance Learning and Classroom Productivity

Overview

Country: United States
Industry: Education

Customer Profile

The Wilkes-Barre Area School District, located in northeastern Pennsylvania, serves 7,000 K-12 students in 10 facilities with a staff of 460 teachers.

Business Situation

The district experienced a six-month gap between statewide assessments and the results of those assessments—making it impossible to meet the student achievement requirements of the NCLB Act.

Solution

Microsoft® Class Server 3.0 and Northeast Micro's eCurriculum Map Designer form the core of the district's solution, and interoperate with Schools Interoperability Framework (SIF)-compliant SIF Implementation Specification (SIS) data.

Benefits

- Cuts six-month delay in assessments
- Enables lesson plan optimization
- Teachers identify, remedy specific problems
- Administrators can spot district issues
- Boosts productivity, cuts costs

"The Class Server solution has made a tremendous difference in our ability to meet NCLB requirements."

Charlotte Kordek, Technology Administrator, Wilkes-Barre Area School District

The Wilkes-Barre (Pa.) Area School District uses Microsoft Class Server 3.0 together with Northeast Micro's eCurriculum Map Designer to meet the challenges posed by the No Child Left Behind (NCLB) Act. Class Server enables the district to administer assessments with immediate feedback, so teachers can adjust class work to ensure optimal learning—and optimal performance on statewide assessments. Teachers can identify problems of specific students, while school- and district-level administrators can view higher level reports—even importing the Microsoft SQL Server 2000 data into Microsoft Office Excel—to identify trends affecting broader groups of students. The district is using Class Server together with eCurriculum Map Designer to tie learning resources to specific standards, allowing teachers to adjust their lesson plans for maximum effectiveness.

NE MICRO

Microsoft® Class Server
Learning Management Platform

"Class Server gives us an entirely new analytical capability that we can use on a very timely basis to ensure that all students are gaining the full benefit of our district education system."

Charlotte Kordek, Technology Administrator, Wilkes-Barre Area School District

Situation

The Wilkes-Barre (Pa.) Area School District looks like many school districts around the country. It serves 7,000 K-12 students in 10 facilities with a staff of 460 teachers. The district also resembles many others throughout the United States in the challenges it faces to meet the requirements of the federal No Child Left Behind (NLCB) Act.

NCLB sets extensive requirements for assessing student performance and ties federal funding to student achievement on those assessments. The challenge that faced Wilkes-Barre, like so many other school districts, was how to obtain and analyze the results of assessments in time to successfully affect student performance. For example, in Pennsylvania, state standards for third-grade achievement are measured in April. But districts such as Wilkes-Barre would only receive the results of those assessments the following October—when those students were already in the fourth grade and it was too late to fine-tune the curriculum in light of the results.

"Waiting for the state assessments was the only way we had to get evidence of how we were performing against state standards—but it took six months to get those results," says Charlotte Kordek, Technology Administrator for the district. "It wasn't acceptable. It meant we had no control over what was happening in the classroom to ensure we were teaching to state standards. We wanted to be able to plan a standards-based curriculum that would be consistent from class to class and from school to school within a given grade."

But like most districts, Wilkes-Barre didn't have that consistency. That was a problem because, when students transferred from one part of the district to another during the school year—and up to 30 percent of students make mid-year transfers in Wilkes-Barre—there was no guarantee they could pick up in their new classes where they'd left off in the former ones. Instead, they might have to repeat days or weeks of curriculum—or miss out on content entirely if the new class was ahead of the former one.

Kordek and her colleagues knew that they needed a technology-based solution to overcome these challenges, mindful as they were of the advice of John Bailey, Director of the U.S. Dept. of Education's Office of Instructional Technology, that "it's almost impossible to enact [NCLB] without technology."

Solution

To develop that solution, Kordek turned to Northeast Micro, a systems integrator also located in Wilkes-Barre. Northeast Micro's Gene Manning, Systems Engineer, was already familiar with the district from his former role as a contract-based network administrator for it. Together, Kordek and Manning turned to Microsoft® Class Server 3.0 as the core of the Wilkes-Barre solution.

Class Server is a powerful learning management environment for delivering assessments and lessons over the Web that enables school districts and teachers to track and improve student achievement against local curriculum standards. Class Server integrates to the data warehouse and enables online curriculum management, course delivery, and assessments.

"There really weren't any competitors to Class Server," says Kordek. "There's nothing else in the marketplace like it. We could have found isolated solutions for, for example, mathematics instruction. But we wanted a central repository for district resources available to all teachers at their grade levels, plus Internet resources, so that everyone could share appropriate material. Class Server could also be a central repository for

"With Class Server, when a teacher moves to a new grade level, everything the teacher needs is right there in one place. Teachers can move seamlessly into their new assignments."

Charlotte Kordek, Technology Administrator, Wilkes-Barre Area School District

assessment information for analysis and reporting and it offered the curriculum management abilities we were looking for."

To ensure that classroom instruction was mapping strongly to Pennsylvania state standards, Northeast Micro developed an eCurriculum Map Designer application to complement and interoperate with Class Server. The eCurriculum Map Designer allows Wilkes-Barre to make more dynamic, interactive use of its curriculum guides than ever before.

First, the software lets the district host those guides in online, rather than in paper-based, format. Second, the district can analyze the guides against state standards and run "frequency reports" that show how many times a given standard is addressed in a given course module or school year. Armed with that information, the district can adjust course content so that it reflects standards appropriately.

Wilkes-Barre deployed the Class Server and eCurriculum Map Designer solution in time for the start of the 2003-2004 academic year. The combined solution, including a Microsoft SQL Server™ 2000 Standard Edition database server to host Class Server data, resides on three HP Proliant servers running Windows Server™ 2003 Standard Edition operating system. Student record information comes into the solution in XML format via a Schools Interoperability Framework (SIF)-compatible third-party student information system, the native SIF agent in Class Server, and a Zone Integration Server (ZIS) to communicate between the applications.

To use the solution, a teacher logs into Class Server and the single logon also provides access to eCurriculum Map Designer, based on the district's use of the Active Directory® service in Windows Server 2003 to maintain records of authorized users for each application. The teacher can work directly in Class Server to access desired learning resources. Or, the teacher can work through eCurriculum Map Designer to view all of the standards objectives for the module he or she is teaching, and then click on an objective to have Class Server pull up all the resources—including printed and Internet-based resources, as well as digital learning resources stored directly in Class Server—for it. Either way, the teacher puts the relevant teaching resources into a class folder, from which the resources can be assigned to students.

The district has developed quarterly assessments to test progress on the standards. The assessments are administered in paper-based format to students in grades K-11 and the results are imported into Class Server. For students in higher grades, the tests are administered directly via Class Server.

Teachers receive the assessment results for their classes via Class Server as soon as the assessments are completed and can use Class Server to query on individual student performance. Administrators import the SQL Server–based assessment data into their familiar Microsoft Office Excel software to analyze the information.

Benefits

Meeting NCLB Requirements

As a result of using Class Server, the district is able to administer assessments on a more-frequent schedule, providing more up-to-date views of student achievement, and to work more quickly—and, thus, more effectively—to modify lesson plans in response to those assessments.

"The Class Server solution has made a tremendous difference in our ability to meet NCLB requirements," says Kordek.

"There really weren't any competitors to Class Server. There's nothing else in the marketplace like it."

Charlotte Kordek, Technology Administrator, Wilkes-Barre Area School District

For example, the solution has eliminated the six-month delay that formerly existed between the time the students take assessments on state standards and when teachers get the results and can put them to use. While there is still a delay, albeit a shorter one, in the results on the formal state assessments, Wilkes-Barre teachers get immediate results on the district assessments—implemented via Class Server—that test on those same state standards.

Teachers now give more-frequent class-based assessments, including assessments at the end of each course module, enabling them to make adjustments in how they teach. Teachers believe they will, as a result, see better performance on state and district exams. Teachers for the first time can re-teach material that the class did not understand—as identified by poor performance on local assessments—before those students take the formal state assessment on that same material.

Enhancing Education

Class Server gives the Wilkes-Barre district entirely new ways to enhance classroom activity to promote better education. The drill-down assessment reports that are available through Class Server enable teachers to identify specific students who are performing poorly on given standards, and to assign remedial learning resources to those students, enabling them to increase their achievement to meet the rest of the class.

Meanwhile, school- and district-level administrators can summarize that same data to identify trends and issues that may affect an entire school or the district as a whole. For example, administrators can focus on the achievement of students in special education and English as a Second Language (ESL) classes, as well as students in specific social or economic groups.

"Class Server gives us an entirely new analytical capability that we can use on a very timely basis to ensure that all students are gaining the full benefit of our district education system," says Kordek.

By providing a central –and highly accessible—repository for learning resources, Class Server also enhances education by giving teachers access to more and better resources for the challenges they face in their classrooms. Teachers are better able to collaborate with their peers, to use best practices of their colleagues, and to access streaming media and other learning resources.

Boosting Productivity

Class Server also boosts productivity for both teachers and IT administrators at Wilkes-Barre. About 10 percent of teachers move from one grade level to another each year. In the past, it took at least a year for a teacher to assemble and learn lesson plans for the new grade level.

"With Class Server, when a teacher moves to a new grade level, everything the teacher needs is right there in one place," says Kordek. "Teachers can move seamlessly into their new assignments without having to rely on peers who may not always be available when needed."

The easy and full integration of Class Server into the district's infrastructure also facilitates its use and boosts the productivity of IT staff in various ways. Integration via Active Directory enables Class Server to operate as part of a single logon solution and to interoperate with student information system data in other software.

"Class Server has eliminated the practice of people ordering all types of software to patch what they saw as holes in our system," says

For More Information

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For more information about Northeast Micro products and services, call (570) 826-7060 or visit the Web site at: www.northeastmicro.com

For more information about Wilkes-Barre Area School District products and services, call (570) 820-3771 or visit the Web site at: www.wbasd.k12.pa.us

Document published May 2004

Kordek. "That saves us a tremendous amount of money both on the software and on maintaining non-standard system components."

Windows Server System

Microsoft Windows Server System™ is a comprehensive, integrated, and interoperable server infrastructure that helps reduce the complexity and costs of building, deploying, connecting, and operating agile business solutions. Windows Server System helps customers create new value for their business through the strategic use of their IT assets. With the Windows Server operating system as its foundation, Windows Server System delivers dependable infrastructure for data management and analysis; enterprise integration; customer, partner, and employee portals; business process automation; communications and collaboration; and core IT operations including security, deployment, and systems management. For more information about Windows Server System, go to: www.microsoft.com/windowsserversystem

Software and Services

- Products
  - Microsoft Class Server 3.0
  - Microsoft Windows Server System
    - Microsoft Windows Server 2003 Standard Edition
    - Microsoft SQL Server 2000 Standard Edition
  - Microsoft Office System
- Technologies
  - Microsoft Windows Active Directory

Hardware

- HP DL 360 servers
- HP ML370 server

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Case Studies

Montgomery County Public Schools

Major School District Addresses "No Child Left Behind" and Aims to Improve Student Achievement with Microsoft Accountability and Assessment Solution

CASE STUDY Posted: 7/5/2003 Printer-friendly Version

At Montgomery County Public Schools, in Rockville, Maryland, the technology and curriculum groups collaborated to create a roadmap for using technology to enable data-driven decision making, as well as to deliver standards-aligned curriculum online to improve student achievement. The Microsoft Assessment and Accountability solution provided the approach to integrate the necessary information for supporting analysis, reporting, and instructional improvement activities as part of a closed loop process for continuous improvement. EDmin.com's Virtual EDucation Solution, powered by Microsoft Class Server, is at the core of this solution which integrates performance data from the student information system into a data warehouse, along with Class Server curriculum learning resources, and assessment scores.

Download Document

- Montgomery County Public Schools
  64 KB Microsoft Word file
- Get Office file viewers

Solution Overview

Customer Profile

Montgomery County Public Schools, in Rockville, Maryland, is the nation's 18th largest and 12th fastest growing school system. Ninety-percent of Montgomery County Public Schools' students graduate.

Related Links

- Microsoft Class Server 3.0
- EDmin.com
- Montgomery County Public Schools

Challenge

For the past two years, Montgomery County Public Schools has been engaged in an extensive research and development project designed to provide the school district with technology solutions to effectively support the implementation of a new standards-based curriculum and provide data and analysis tools to teachers and administrators. The project was designed to enable teachers to use data to help with instructional planning and create intervention strategies for every child. Additionally, the district wanted a solution that would easily integrate with its data warehousing initiative.

"Our Integrated Quality Management System is designed for strategic and tactical planning," says John Q. Porter, Associate Superintendent and Chief Information Officer. "The data warehouse will contain historical, instructional and business data to permit complex, strategic analysis. The Instructional Management System provides schools with tactical planning tools for the day-to-day decisions that have such a significant impact on student achievement."

Solution

After a successful Virtual EDucation demonstration project deployment, Montgomery County Public Schools wanted to see what other options might exist so the district issued an RFP in early 2002. EDmin.com's solution, Virtual EDucation, withstood a rigorous review and selection process and was selected for several reasons:

- Montgomery County Public Schools saw that EDmin's Virtual EDucation system is a leader in comprehensive instructional and performance management solutions for K-12 school districts.
- Virtual EDucation is a standards-based, learning management system that will be compatible with the district's data warehousing project.
- Virtual EDucation provides timely reports for all stakeholders to use in identifying learning gaps, designing intervention strategies, formulating instructional plans, and continuously monitoring student progress over time.

- In addition to teachers and administrators, Virtual EDucation has the capability to be accessed by parents and students.
- Virtual EDucation contains a digital portfolio application that allows educators to capture authentic assessments, and facilitate the development and sharing of best practices and resources among teachers across the school district.

Benefits

Virtual EDucation has now been implemented for grades K-2 in all of the district's elementary schools. The project's current focus is to provide principals with timely data on state tests, district assessments, and report card grades to further Montgomery County Public Schools' accountability initiatives. This project is successfully providing a wide range of on-line data such as student and class information as well as standardized test, back-mapped standards, and curriculum data to help improve instructional decisions.

As Jody Leleck, Principal at Broad Acres Elementary School, says, "The system allows me to quickly access and analyze both summative and formative student performance data to inform instructional decisions throughout the school year, not just when standardized test data arrives annually. My job does require analyzing data to be an effective instructional leader; however, I need to spend time in classrooms and with parents, too. This allows me to keep these two critical aspects of my job in balance."

More than 64,000 data files have been entered into Virtual EDucation covering more than half of the district's 191 school sites. Montgomery County Public Schools is currently using 40 percent of Virtual EDucation's applications including the Standards, Performance Center, Instructional and Classroom Management Applications.

A Scalable and Flexible Solution

As a result of the successful Virtual EDucation implementation, the district decided to look at how additional tools could be integrated with the system to assist teachers with instructional planning a student intervention. EDmin recommended Microsoft® Class Server to Montgomery County Public Schools.

In February 2003, Montgomery County Public Schools agreed to have EDmin and Microsoft begin implementing Class Server with Virtual EDucation to offer teachers even greater instructional and curriculum management services. Class Server provides teachers immediate access to a variety of instructional and learning resources aligned to district standards. Teachers can prepare standards-based assessments that track student achievement in real time.

Virtual EDucation is being used to store, access, and disseminate standards-based student performance results to all Montgomery County Public Schools K-3 elementary teachers. Microsoft Class Server is the learning management platform that the district will be using to empower its teachers and improve learning for all students. When deployed with Virtual EDucation, Class Server allows Montgomery County Public Schools to regularly analyze student achievement against the district's curriculum standards before the high stakes Maryland achievement tests at the end of the school year, and assign individual remediation based on each student's strengths and weaknesses.

Administrators can easily analyze information from the Microsoft SQL Server™ data warehouse to correlate student performance with influencing factors. Using this information, they are able to identify the best practices for modifying the learning environment. When changes to the learning environment are delivered through Class Server, the results are captured and can later be scientifically validated against earlier assumptions.

> "The system allows me to quickly access and analyze both summative and formative student performance data to inform instructional decisions throughout the school year, not just when standardized test data arrives annually."
>
> **Jody Leleck**
> **Principal, Broad Acres Elementary School,**
> **Montgomery County Public Schools**

Using Virtual EDucation and Class Server, teachers can manage all of their classes and lessons in one place. They can deliver high quality lessons over the Web, differentiate instruction for students, download and share lessons and assessments from the district repository and align lessons and assessments to Montgomery County Public Schools curriculum standards. Once they use the system to grade student work and tests, they can export the grades to Virtual EDucation's progress monitoring application or any other third-party grade book. EDmin is overseeing the implementation and integration of Virtual EDucation and Microsoft Class Server and providing training for teachers and administrators.

Great Return On Investment, Total Cost of Ownership with Integrated EDmin, Microsoft Solution

Montgomery County Public Schools has experience with Return on Investment (ROI) and Total Cost of Ownership (TCO). The district views Class Server and Virtual EDucation as a way to maximize its ROI and minimize TCO because content, assessments, and instructional resources can be integrated into one system. All users can easily access the management system through any computer with a Web-based browser, so the need for technology support is minimized. Additionally, all Virtual EDucation upgrades occur through the Web and do not require on-site installation by the district's information technology staff.

Moving forward, Montgomery County Public Schools envisions a learning environment where an easily accessed Instructional Management System provides data to drive instructional practice. Teachers have the necessary tools to help differentiate and personalize instruction for all students. Assessment and accountability play a significant role in Montgomery County Public Schools' strategic plan and school district leaders believe that Virtual EDucation and Class Server will provide added value as well as enable the district to meet its objectives through the solution's ability to share critical information throughout the district,

For More Information

For more information about Microsoft products or services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada information Centre at (800) 563-9048. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information via the World Wide Web, go to: http://www.microsoft.com/education

For more information about technology in Montgomery County Public Schools, please contact the Office of Global Access Technology, 301-279-3581. To access information via the World Wide Web, go to http://www.mcps.k12.md.us.

Last updated: October 28, 2003

Philadelphia Schools Tie Curriculum to Standards, Gain Timely Student Remediation

Overview

Country: United States
Industry: Education

Customer Profile

The School District of Philadelphia serves more than 200,000 students in 276 schools. The district has more than 21,000 employees and a budget of some U.S $1.7 billion.

Business Situation

The district lacked a core curriculum tied to state standards and a way to administer periodic assessments with real-time feedback to guide instruction.

Solution

The SchoolNet Instructional Management Solution based on Microsoft® Windows Server System™ provides a centralized database for curriculum, learning resources, assessments, and analysis.

Benefits

- Real-time benchmark results
- Prompt, effective remediation
- Constructive teacher-principal interaction
- Targeted professional development
- Achievement of NCLB goals

"The SchoolNet solution and Microsoft technology have delivered student data to the teacher's desktop in ways never before possible. And not just data, but curriculum too, linked to that data."

Dr. Fran Newberg, Project Manager, School District of Philadelphia

As part of a comprehensive school improvement planning process, the School District of Philadelphia is engaged in a district-wide rollout of the SchoolNet Instructional Management System (IMS), based on Microsoft Windows Server System technology. SchoolNet has deployed an instructional data warehouse in which to house and integrate the district's student information, state tests, local benchmark assessment data, curriculum, educational resources, and standards information. As a result, at the beginning of the year and at the conclusion of each instructional unit, teachers can immediately access assessment data tied to the curriculum and can personalize instruction for their students. Principals can become effective coaches to guide planning and remediation. And district-level administrators can tailor professional development programs to real-time district needs and thus better meet the targets of the federal No Child Left Behind (NCLB) Act.

schoolnet
Data-Driven Decision-Making

Microsoft Windows Server System

"If a benchmark test is delivered on Friday, adjustments can be made in the instruction by Monday."

Patricia Renzulli, Chief Information Officer, School District of Philadelphia

Situation

The School District of Philadelphia faces many of the same challenges as other large, urban school districts, including, amongst other issues, a transient student population. Up to 35 percent of students typically move from one school to another within the district in any given year. The district needs to ensure that learning continues seamlessly for such students. That requires the students' new teachers and administrators to have immediate and full access to their students' profiles and for the curricula at district schools to be synchronized to core standards.

Philadelphia realizes that timely access to assessment data is paramount so that teachers can react quickly to student strengths and weaknesses. However, standardized tests—the Pennsylvania Statewide Standardized Assessment (PSSA) and Terra Nova exams—are given only twice a year and the results take months to return. So, students take the tests in the spring and teachers see the results the following fall—when those students are no longer in their classes. Teachers are recognizing the importance of using assessment data to modify lesson plans and to offer remediation. In addition, having digital assessment data at their fingertips highlights teachers' needs to have curriculum and resources aligned to district and state standards.

The enactment of the federal No Child Left Behind (NCLB) Act has placed significant pressure on schools to improve or face consequences. Student profiles, assessment data, and aligned curriculum all lead towards increased academic achievement and school improvement. NCLB sets extensive requirements for assessing student performance and ties federal funding to student achievement. Districts need to measure not just individual performance on standards, but also performance on subjects with subgroups aggregated by ethnicity, gender, special needs, English as a second language, and other criteria.

Philadelphia's Instructional Management System project was initiated to solve the problems of curriculum and alignment and delivery of assessment results for data-driven decision making. The district recognized its need to analyze and collect data, and to gain the access and knowledge to use such information to guide classroom instruction and boost student achievement.

Solution

"The district has always used data," says Dr. Fran Newberg, Project Manager, School District of Philadelphia. "In the past however the district relied on hard copies of standardized test data and yearly summaries that were prepared by district administrators which often reflected data from the previous year. Now, the Instructional Management System puts all relevant student data at the fingertips of teachers and principals, making data-driven instructional decisions easier than ever. In addition, the system disseminates interim assessment data. Interim assessments are administered several times a year, enabling teachers and principals to make mid-course corrections to daily instruction and School Improvement Plans."

To address the need for data-driven decision-making and deployment of an aligned curriculum, the School District of Philadelphia this year rolled out a district-wide implementation of SchoolNet's IMS. The solution takes advantage of the Microsoft® Windows Server System™ integrated server software and Microsoft .NET–connected Web services. It is compatible with the School Interoperability Framework (SIF) and was developed with the Microsoft .NET Framework 1.1 and Visual Studio® .NET 2003 development system. The .NET Framework is an integral component of Microsoft

"With rich, real-time assessment data on individual students, classes, and entire grades, teachers and principals can have a more collegial, constructive approach to enhancing student performance."

Dr. Fran Newberg, Project Manager, School District of Philadelphia

Windows® operating system that provides a programming model and runtime for Web services, Web applications, and smart client applications.

The solution centers on a .NET-connected Web portal and a 100GB data warehouse—based on Microsoft SQL Server™ 2000 and hosted at SchoolNet —that provide a single, centralized location to integrate all of the district's student information, state tests, benchmark assessment data, curriculum, educational resources, and standards information.

Microsoft technology is central to solving the massive integration challenge. For example, SQL Server Data Transformation Services enables the solution to integrate legacy data including student information system data from the district's mainframe. And Web services pull assessment data into the solution from third-party assessment providers quickly, securely, and without the complexities and costs of alternative technologies.

Key SchoolNet components in the Philadelphia solution are SchoolNet's Account, Align, and Assess, modules.

- Account is an accountability and analysis solution for district administrators. The module allows users to analyze student assessment data without requiring technical statistical methods. District users can access, analyze, and compare district data to understand trends, target remediation, and allocate resources. A suite of NCLB reports and data analysis tools assist principals and superintendents in understanding the relationship between their assessment data and NCLB's Adequate Yearly Progress (AYP) requirements.
- Align delivers a teacher dashboard to view differentiated student performance data and to plan individualized instruction including academic standards, pacing calendars, lesson plans, and curricular materials. It also provides a set of tools to enable district curriculum staff to develop and disseminate state and local standards, curricular guides, and best practices. Teachers use Align to monitor their planning and coverage of required standards, to access standards-aligned curriculum and materials, and to view student mastery of required academic standards.
- Assess is a benchmark testing administration system. It allows districts to integrate a benchmark testing regime delivered by scan forms, plain paper forms, or online test entry. Item analysis at building and district levels can help determine efficacy of questions as well as institutional needs for professional development or curriculum enhancement. Data from the assessment solutions flows into SchoolNet's data warehouse.

The district began its wide rollout of the solution this year after completing a carefully phased pilot program over the past two years. Four schools tested the solution two years ago and a broader group of 21 schools piloted the solution last year. This year, data for more than 200,000 students went live for principals and administrators to analyze. In addition, teachers in 50 schools went online with the solution with full access to the system, and the district's remaining schools are scheduled for full deployment over the next two years.

The solution takes advantage of the district's upgrade to fiber to give users real-time access to the applications and data hosted at SchoolNet. The phased SchoolNet deployment has followed the phased rollout of the expanded bandwidth.

The SchoolNet solution and Microsoft technology are helping to make teachers more effective in the classroom—while administrators have the data they need to make better decisions.

Deploying the solution over several years has also given the district time to train teachers and administrators, including some who had never made significant use of computers before. More than 1,500 people throughout the district trained on the solution during a major education program in October 2003, prior to the 50-school rollout. That training included four-person "principal teams"—including a school principal, a technology lead, a math coach and literacy coach—from the district's 250-plus schools. Those teams worked with the solution this year and were able to retrieve reports for their teachers, prior to the teachers receiving access to the system.

Benefits

The SchoolNet solution and Microsoft technology are helping to make teachers more effective in the classroom—while administrators have the data they need to make better decisions.

Making Teachers More Effective

For the first time, the SchoolNet solution gives teachers curriculum that is explicitly linked to standards across grades as well as immediate feedback on benchmark assessments tied to the curriculum and standards. That makes teachers more effective in the classroom, according to Newberg.

"The SchoolNet solution and Microsoft technology have delivered student data to the teacher's desktop in ways never before possible," says Newberg. "The system delivers curriculum and instructional resources in addition to student-related data. Interim assessment data is linked to the state standards, the district's core curriculum and instructional resources. The system has the potential to track how many times a particular standard was taught and when in the curriculum they will return to that standard. It makes for far more effective teaching."

For example, teachers can now administer standard assessments at the end of a teaching unit—approximately every six weeks—and, using reports they access through the Align module, see in real time which students understand the curriculum, which students don't, and with which components they have problems. Teachers can then use remediation time built into the teaching schedule to review material as appropriate. The reports also enable teachers to create subsets of students in their classes, organized by the remediation they need, and then implement differentiated learning programs geared to their needs.

"If a benchmark test is delivered on Friday, adjustments can be made in the instruction by Monday," says Patricia Renzulli, Chief Information Officer, School District of Philadelphia.

"In one recent class, I observed a teacher discussing test results with her students within minutes of the time they took the test," says Newberg. "The teacher and students were able to discuss right and wrong answers with an immediacy they never had before. A student expressed surprise that he got a particular answer wrong and the teacher asked him why he got it wrong. That led to a discussion about the thought process behind that answer. That's a very powerful classroom activity."

Making Better Decisions Throughout the District

Beyond enhancing the interactions of teachers and students in the classroom, the SchoolNet IMS is also enabling principals and district-level administrators to make better decisions affecting the quality of instruction at school, region, and district levels.

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to: www.microsoft.com

For more information about SchoolNet products and services, call (866) DATA-DRIVEN or visit the Web site at: www.schoolnet.com

For more information about the School District of Philadelphia, call (215) 299-7000 or visit the Web site at: www.philsch.k12.pa.us

Document published September 2004

For example, principals can be more effective mentors and coaches with their teachers by reviewing the same benchmark assessment data that teachers see for their classes and then working constructively with those teachers to identify additional actions—including remediation for the class or for specific students. These discussions can take place in one-on-one principal-teacher discussions over proposed lesson plans as well as in the higher-level, monthly meetings that many of the Philadelphia principals have with all teachers in a given grade within their schools. Further, principals can use the assessment information to better direct the efforts of the math and literacy coaches in their schools.

Administrators at the district level, meanwhile, can use the SchoolNet IMS for longitudinal analysis, cohort analysis, value added analysis, and relational analysis to identify weaknesses across grades and schools, and then devise appropriate professional development programs. In addition to meeting their own district goals, district administrators are using SchoolNet to meet the requirements of NCLB.

"With rich, real-time assessment data on individual students, classes, and entire grades, teachers and principals can have the platform on which to build a more collegial, constructive approach to enhancing student performance," says Newberg.

Microsoft Windows Server System

Microsoft Windows Server System integrated server infrastructure software is designed to support end-to-end solutions built on Windows Server 2003. It creates an infrastructure based on integrated innovation, Microsoft's holistic approach to building products and solutions that are intrinsically designed to work together and interact seamlessly with other data and applications across your IT environment. This allows you to reduce the costs of ongoing operations; deliver a more secure and reliable IT infrastructure; and drive valuable new capabilities for the future growth of your business.

For more information about Windows Server System, go to: www.microsoft.com/windowsserversystem

Software

- Microsoft Windows Server System
  - Microsoft Windows Server 2003 Enterprise Edition
  - Microsoft SQL Server 2000
- Microsoft Visual Studio .NET 2003
- Technologies
  - Microsoft .NET Framework
  - Web Services

Partner

- SchoolNet

Microsoft®

Connecticut Schools Boost Learning, Assessment, While Cutting Costs up to $300,000

Capitol Region Education Council

Overview

Country: United States
Industry: Education

Customer Profile
The Capitol Region Education Council manages eight magnet schools and serves 35 school districts with 266 schools and more than 155,000 students in the greater Hartford area.

Business Situation
CREC magnet schools are a model for others in its region, which means it needs to implement model processes that meet the growing challenges of education.

Solution
Microsoft® Class Server, deployed at three magnet schools, is part of an outsourced solution that gives CREC the benefits of leading-edge technology at greatly reduced cost.

Benefits
- Teachers save up to 15 hours grading exams
- Greater ability to meet NCLB requirements
- Test results returned up to three months faster
- Richer resources for curricula development
- TCO reduced by up to 80 percent

"Class Server enables us to track a tremendous amount of data on student performance very effectively. We can give tests on a regular basis because we get instantaneous results."

Jerry Crystal, Director of Technology Integration at Hartford Magnet Middle School

Connecticut's Capitol Region Education Council (CREC) turned to an ASP-hosted solution from Digital BackOffice (DBO) to manage its datacenter functions – and it turned to DBO's ASP-hosted version of Microsoft® Class Server to revolutionize the process of education in several of its magnet schools. The solution enables CREC to meet federal No Child Left Behind requirements because teachers have a better understanding of students' progress and problems based on more frequent and more meaningful assessments. When teachers create lesson plans, they have immediate access not only to state standards but also to resources throughout the organization and around the world. Teachers can tailor teaching to the needs of specific students. And CREC estimates the outsourced Class Server at three locations saves it up to $45,000 over the operating costs of maintaining local servers, with the savings rising to $300,000 as it continues the deployment.

"Class Server changes the way our teachers educate our students. They have more resources available to them than ever before and they have better, faster ways to gauge the effectiveness of instruction."

Lee Noury, Technology Coordinator, MLC

Situation

The Capitol Region Education Council (CREC) is one of six regional educational service centers in Connecticut that serve as bridges between local education authorities and the state. In addition to supporting school districts in and around Hartford, CREC also manages eight magnet schools covering themes as diverse as world affairs, mathematics and science, and the arts. CREC's magnet schools are inevitably models for the affiliated schools districts. As such, they must be exemplars of educational practice.

That's a particular challenge as the requirements facing school administrators and teachers continue to rise. The No Child Left Behind (NCLB) Act sets extensive requirements for assessing student performance and ties federal funding to achievement on those assessments. Actually boosting student performance requires new ways of teaching, in which teachers can more effectively tailor curriculum and class progress to the needs of their students. It also requires continual teacher improvement through continuing education. And parents want to play an increasingly active role in following and understanding the progress of their children.

CREC needs ways to accommodate these requirements and more as it administers its magnet schools. With the September 2001 opening of its $32 million Metropolitan Learning Center (MLC) facility, which now serves 600 students in grades 6 to 11, CREC had an opportunity to showcase the use of technology in education.

The school's mission is to provide a forum for global and international studies so that students experience the diverse cultural, linguistic, political, and business perspectives of the world, while developing the skills they need to be citizens in the international workplace.

A key part of the CREC technology solution for MLC was the outsourcing of the CREC datacenter to Digital BackOffice (DBO), a Milford, Conn.-based managed service provider specializing in K-12 education. DBO provided MLC with an ASP-hosted, fault-tolerant network design with 99.99 percent availability, an integrated telecommunications network, firewall protection between the Internet and private network, and a high-speed Internet gateway.

The DBO solution supports a range of administrative and technical needs at MLC, including business and financial applications, student information systems, and e-mail messaging. But the heart of a school's mission is accomplished in the classroom. MLC needed its DBO solution to support it there, as well.

Solution

And that it does, through DBO's ASP-hosted version of Microsoft® Class Server 3.0, called DBO Class Server. Class Server is a powerful learning management solution for delivering assessments and lessons over the Web that enables school districts and teachers to track and improve student achievement against local curriculum standards. Class Server integrates to the data warehouse and enables online curriculum management, course delivery, and assessments.

CREC deployed Class Server at MLC and has since gone on to deploy it at its Hartford Middle Magnet School and its Two Rivers Magnet Middle School, as well. CREC takes advantage of DBO Class Server as a subscription-based application service through which DBO provides all server software and hardware, subscriber access licenses, daily backup, security, network connectivity, and maintenance. DBO Class

"Class Server is an invaluable addition to our infrastructure because it directly addresses core challenges of education."

Gary Duprey, Director, Division of Technology Service, CREC

Server runs on the Microsoft Windows Server™ 2003 operating system with Internet Information Services (IIS) 6.0, in a Windows Server System™ environment that also includes Exchange 2000 Server and SQL Server™ 2000.

Rather than hosting Class Server and the related Windows Server System members at each of the schools running Class Server, CREC uses a fiber-based ATM SONET connection at speeds of 4 to 8 Mbps to connect its LAN to the DBO central location, where DBO Class Server is hosted. A single HP Proliant ML370 server running Class Server supports the 1,500 Class Server users at the three CREC schools. That server can support additional users and can be scaled out with additional servers as needed.

Enhancing Testing

MLC uses Class Server from the moment students enter the school, according to Lee Noury, Technology Coordinator. Incoming students are given math and reading tests to determine their comprehension levels and to place them in appropriate classes. The old pencil-and-paper tests that MLC used have been replaced with placement tests administered via Class Server.

The use of Class Server for placement testing also acclimates students to what will be a common experience during their time at MLC. The school uses Class Server to administer preparatory tests for the statewide Connecticut Mastery Tests (CMTs), class exams, and pop-quizzes. Microsoft Office System agent characters also play a role in CREC test-taking. MLC has created a script for the Merlin character to guide students through a quiz that tests their Web search and management skills.

Creating Curriculum

Teachers at MLC, Hartford Magnet Middle, and Two Rivers Magnet Middle not only use Class Server for testing – they also use it to create the curricula for teaching the information on which they will later test.

One of the guides in creating curricula is the Connecticut state standards that CREC students are expected to master. Class Server puts those standards at the fingertips of CREC teachers. When teachers choose the "create a learning resource" command in Class Server, they can view the standards that their curricula is expected to meet.

Beyond viewing state standards, teachers also use Class Server to view and incorporate lesson-related content from Microsoft Encarta® multimedia encyclopedia and from "shared learning resources." Those resources include not only existing curricula created by other CREC teachers, but also resources that teachers anywhere in the world choose to make available over the Internet. Class Server supports the IMS content packaging specification, giving teachers access to any standard content. MLC teachers have used "shared resources" content from as far away as Australia.

Benefits

Class Server helps CREC to meet NCLB requirements in a variety of ways. First, it enables teachers to test students more frequently and, thus, obtain clearer pictures of their progress and problems by making tests easier to administer and grade.

"Class Server enables us to track a tremendous amount of data on student performance very effectively," says Jerry Crystal, Director of Technology Integration at Hartford Magnet Middle School. "We can give tests on a regular basis because we get instantaneous results. And Class Server puts the results into Microsoft Excel and Access databases so we can compare student performance to past performance or the performance of other students and create

reports for a variety of demographic categories."

At MLC, for example, the placement tests for 100 students used to take 10-15 hours of teacher time to grade. Now, those tests are graded immediately by Class Server, freeing teacher time for curricula development and other more strategic activities.

Teachers can import their Class Server test results into grade book programs, facilitating student grading at the end of the semester and eliminating the lag that previously existed as teachers struggled to enter their grades. Test results are rolled up into grade, school, and even CREC-wide reports.

Improving Education

Even more important than meeting federal and other statutory requirements, immediate test results benefit students and teachers by improving the process of education.

"Before, it could take two or three months to get the results back on state exams," says Lee Noury, Technology Coordinator for the MLC. "In that amount of time, you could really have lost a child. Now, with Class Server and the results in hand almost as soon as the student has taken the test, the teacher can start addressing the child's areas of concern right away."

With Class Server test results in hand, teachers can divide students in a class into subgroups to focus on particular areas of the curriculum. Teachers also can modify their lesson plans if the results of tests and quizzes show that a significant portion of a class is not following the material.

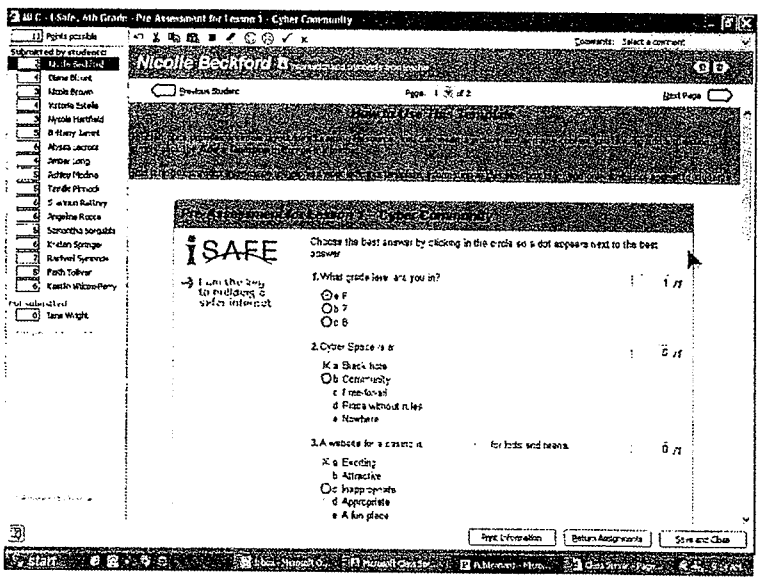
"Class Server changes the way our teachers educate our students," says Noury. "They have more resources available to them than ever before and they have better, faster ways to gauge the effectiveness of instruction. They have more time to create better lessons and to understand how students respond to those lessons. Our teachers have the opportunity to move in directions they may not have considered before."

Class Server is boosting the education process in other ways as well. At Hartford Magnet Middle School, for example, Class Server not only delivers educational resources to the students – the school also uses it to provide state-mandated continuing education to teachers. And CREC is also piloting a Web site that enables parents to access Class Server data on their children, so that the parents can be better informed of their children's progress and problems.

Reducing Costs

CREC's decision to deploy Class Server as part of its broader DBO-hosted environment is also saving significant dollars for the organization. Gary Duprey, Director, Division of Technology Service for CREC, estimates that the ASP-hosted version of Class Server at three locations saves up to $45,000 over the

With Class Server, teachers can find and adapt learning resources, such as this test template, to quickly develop curricula materials.



For More Information

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For more information about Digital BackOffice products and services, call (203) 874-5545 or visit the Web site at: http://www.digitalbackoffice.com

For more information about Capitol Region Educational Council, call (860) 247-2732 or visit the Web site at: http://www.crec.org

cost of purchasing and maintaining the hardware and software for dedicated servers in each of the three schools now running the solution.

Overall, he estimates that CREC has achieved a reduction in total cost of ownership (TCO) of 60-70 percent – approximately $180,000 – for its entire technology infrastructure, due to outsourcing to DBO. And Duprey estimates that as CREC rolls out DBO Class Server to 19 magnet schools and programs, it will save approximately $300,000.

"Class Server is an invaluable addition to our infrastructure because it directly addresses core challenges of education," says Duprey. "The fact that we can implement it – and the rest of our infrastructure – while saving hundreds of thousands of dollars means we have the best of both worlds."

Microsoft Class Server

Microsoft Class Server 3.0 makes it easy for school districts to create, deliver, and grade standards-aligned tests and lessons over the Web—helping teachers track and improve student achievement against local curriculum standards, and meet the challenges of No Child Left Behind.

For more information about Microsoft Class Server, go to: http://www.microsoft.com/classserver

Software

- Products
  - Microsoft Class Server
  - Windows Server System
    - Microsoft Exchange 2000 Server
    - Microsoft SQL Server 2000
    - Microsoft Windows Server 2003 Standard Edition
    - Microsoft Internet Information Services
  - Microsoft Office System

Hardware

- HP Proliant DL370 servers

Partners

- DigitalBackOffice

Document published March 2004

Microsoft®

Microsoft Windows 2000 Server Family

MICROSOFT CUSTOMER SOLUTION: EDUCATION

Bayonne Public School District

Bayonne Schools Meet Government Reporting Mandates While Saving Hundreds of Teacher-Hours

Published: July 2003

The Bayonne Public School District needed a new, integrated, anytime, anywhere database solution to facilitate records on its special-needs students and to ensure that it could meet the increasing burden of government-mandated reporting. The district achieved this with TIENET from TIECorp, based on Microsoft Windows Server and the Microsoft .NET Framework. The district can now redirect hundreds of teacher and support staff hours formerly devoted to administration to the business of teaching.

Situation

The Bayonne Public School District serves the densely populated, largely blue-collar community of Bayonne, NJ. Its 12 schools serve some 8,000 students, including 1,500 special-needs students ages 3 to 21.

While Bayonne has been recognized as one of the top 25 districts in New Jersey for technology, its technology infrastructure had not met its varied administrative needs. The problem was especially keen in the Special Services department, where multiple databases containing student records were not linked, so that changes made to one database had to be manually entered into each of the others.

Further, district special-needs educators, who worked throughout the district, couldn't easily access and review the individual education plans (IEPs) for their students because of the lack of a single, integrated database that could be accessed easily at any time from any location. It was impossible to effectively report progress to parents in a timely fashion. And the increasing range of federal government standards was upping the ante on paperwork for each student.

Solution Overview

Microsoft Global Gold Certified Partner
TIECorp

Sector
Government/Public Education

Company
The Bayonne Public School District serves the densely populated, largely blue-collar community of Bayonne, NJ. Its 12 schools serve some 8,000 students, including 1,500 special-needs students ages 3 to 21.

Situation
The district needed an anytime, anywhere database solution to facilitate records on special-needs students and to ensure that it could meet the government-mandated reporting.

Solution
TIENET, from TIECorp, is based on the Microsoft® Windows Server System™ and the Microsoft .NET Framework.

Benefits
- The district saves hundreds of teacher-hours, now redirected to education.
- Without the Microsoft Windows® platform, Bayonne's solution would not have been possible at a cost-effective price.

Microsoft Software
- Microsoft Windows 2000 Advanced Server with Internet Information Services (IIS) 5.0
- Microsoft SQL Server™ 2000
- Microsoft Visual Studio® .NET

Microsoft® CERTIFIED Partner

When it came time for Carol Trojan, Director of Special Services for the Bayonne Schools, to complete the annual state-mandated report on the district's special-needs population, it took her a week to manually tally data for the 11 required tables—and a single error would force her to review all the figures to make a correction.

"I took the work home and it still took me a week to complete," says Trojan. "It was overwhelming. And it kept me from working on programs that would directly serve the needs of our students. I swore we'd never complete a report this way again."

Trojan and the district wanted to replace their existing infrastructure with a single database solution, accessible to authorized users anytime, anywhere, that would allow educators to identify the special educational needs of each student, generate federal and state mandated reports, and create district-level analyses without the manual processes they had been using.

"Much of the code you'd otherwise need to write is already available in the .NET Framework's class libraries. The integrated development environment cut our development time in half—enabling us to offer a more cost-effective solution to our customers."

Paul Nick
Chief Technology Officer
TIECorp

Solution

Finding the Right Partner: TIECorp

Since 1986, TIECorp, located in Red Bank, New Jersey, has been developing and implementing technology-based instructional management and special education solutions for hundreds of educational settings throughout the country. Its Web-based *TIE*NET product provides a cohesive system which manages all functions related to the instructional process.

Bayonne schools chose TIECorp to implement its integrated Special Services database solution both because of the strengths of its solution and because of its reputation for quality service.

"Everything we'd heard about TIECorp was borne out by our experience with them," says Trojan. "They were always supportive. Whenever we called with a question, we had an answer by the end of the day. The TIECorp people are very good at what they do and very attuned to state government requirements, so they could anticipate the changes that we needed to accommodate."

The Right Technology: Windows Server System and the .NET Framework

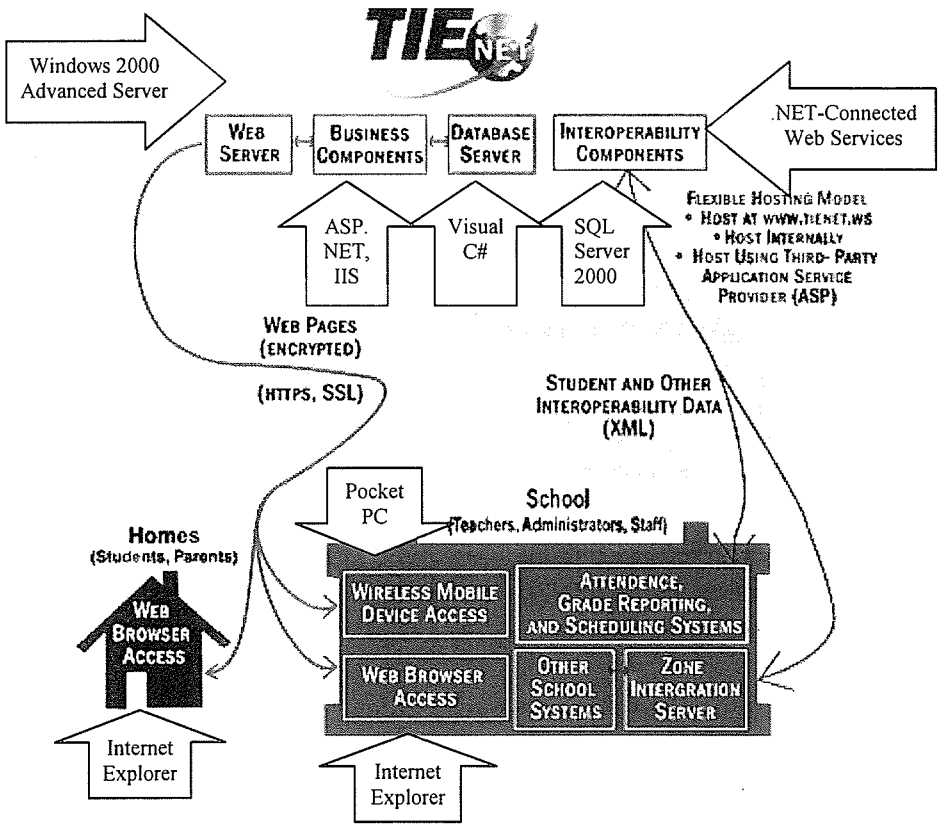
The Bayonne school district has the database solution it wanted in TIECorp's TIENET, a Web-based instructional management infrastructure solution designed for K-12 schools and districts. *TIE*NET addresses both accountability and mandated-reporting requirements related to delivering instructional services to students in both regular and special education.

*TIE*NET is a three-tier Web-based solution based on the Microsoft® Windows Server System™ and the Microsoft .NET Framework:

- At the **presentation layer**, a Web Server running Microsoft Windows® 2000 Server with Internet Information Services (IIS) supports a Microsoft ASP.NET application layer that authorized users can access from any standard Web browser. Users can access a comprehensive calendaring system, special needs workflow processes, and IEPs for their students.
- **Business logic components** that enable the solution, and serve as a bridge between the presentation and database layers, were custom created by TIECorp using Microsoft Visual C#® and the Microsoft Visual Studio® .NET integrated development environment. The business logic provides a sophisticated ad-hoc reporting system that includes multi-dimensional analysis with graphics. The business logic also enforces a sophisticated security model based on access privileges, users, and user groups.
- The **database layer** is based on Microsoft SQL Server™ 2000. A custom application component utilizing XML-based Web services and SQL Server data transformation services (DTS) integrates the solution with the district's existing, legacy data systems, including the student information systems data.

"If it weren't for the Windows Server System and the .NET Framework, TIENET wouldn't be possible—certainly, not with this functionality and at its very cost-effective price."

Paul Nick
Chief Technology Officer
TIECorp



TIECorp customized and deployed the solution—including importing data from Bayonne's legacy solutions and training its staff—in three months. Teachers and administrators have access to the documents they need to create, access, and work

with IEPs. They can also generate online progress reports. SSL-encryption enables teachers to access the solution over the Internet, even from their homes or other locations outside of school property, while restricting access to authorized users.

Benefits

Powerful Yet Cost-Effective Solution

"If it weren't for the Windows Server System and the .NET Framework, TIENET wouldn't be possible—certainly, not with this functionality and at its very cost-effective price," says Paul Nick, Chief Technology Officer at TIECorp. "Microsoft technology gives the flexibility and scalability we need to meet the needs of customers such as the Bayonne schools with a solution uniquely matched for their needs."

Nick cites Visual Studio .NET and the .NET Framework with enabling TIECorp to develop *TIE*NET with just half the code it would have had to write using another environment.

"Much of the code you'd otherwise need to write is already available in the .NET Framework's class libraries," says Nick. "The integrated development environment with its instantly available documentation and IntelliSense® technology for auto-completion of code cut our development time in half—enabling us to offer a more cost-effective solution to our customers."

With more efficient code, *TIE*NET is also easier and more cost-effective to maintain, according to Nick. That means that Bayonne schools and other TIECorp customers have a more reliable solution with less downtime. When issues do occur or when it's time for solution updates, TIECorp can use the Terminal Services in the Windows Server System to respond remotely, rather than having to travel out to the server. Nick estimates that the district saves at least $8,500 in reduced support costs.

The Bayonne school district benefits from service that is both more timely and more cost-effective.

Education Processes are Enhanced

The Bayonne school district now has its single, integrated, anytime anywhere solution for completing IEPs. The solution ties together the entire special-needs education process, from assessing the educational progress of students to generating the mandated reports and communicating those results to parents, the district, and teachers. The district is now confident that it can meet government reporting requirements.

Moreover, the solution enhances the process of education by enabling teachers to spend less time completing IEPs and more time working with students.

"We save hundreds of teacher-hours per year thanks to TIECorp and Microsoft," says Trojan. "The Web-based solution is quicker than anything we used before and the ability to access it securely over the Internet means that teachers can work on their reports from home. The time saved on administration translates directly into more time our teachers can spend with students. And that's what it's all about."

"We save hundreds of teacher-hours per year thanks to TIECorp and Microsoft. The Web-based solution is quicker than anything we used before. The timed saved on administration translates directly into more time our teachers can spend with students. And that's what it's all about."

Carol Trojan
Director of Special Services
Bayonne Public School District

For More Information

TIECorp

Since 1986, TIECorp, located in Red Bank, New Jersey, has been developing and implementing technology-based instructional management and special education solutions in hundreds of educational settings throughout the country. Its Web-based *TIE*NET product incorporates these solutions into a cohesive system which manages all functions related to the instructional process.

For more information about TIECorp products and services, visit the Web site at: http://www.tiecorp.com/.

Bayonne School District

For more information about the Bayonne School District, visit the Web site at: http://www.bboed.org/.

Microsoft

To learn more about the Microsoft Windows Server System, visit www.microsoft.com/windows. For more information about Microsoft solutions, visit www.microsoft.com/casestudies.

The Windows Server System a comprehensive family of Microsoft server applications for quickly building, deploying and managing integrated, Web-based solutions. Designed to deliver mission-critical performance, the Windows Server System is built from the ground up for interoperability using public Internet standards such as XML.

For more information about Microsoft products or services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada information Centre at (877) 568-2495 or (905) 568-0434. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary.

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Microsoft Office System
Customer Solution Case Study

Northeastern University

Students Study More Efficiently, Faculty Researchers See Increased Productivity

Overview

Country: United States
Industry: Education

Customer Profile
Northeastern University is a Boston-based private research university serving more than 18,500 undergraduates and 3,600 graduate students.

Business Situation
Virtually every student and faculty member confronts the challenges of taking comprehensive and accurate notes and then finding and using relevant content quickly and effectively.

Solution
The Microsoft® Office OneNote™2003 digital note-taking program enables students and faculty to capture information in virtually any format, and search and organize more easily and efficiently than ever before.

Benefits
- Easier studying
- Faster responses in class
- Better grades
- More efficient and accurate searches

"Students and faculty who use OneNote organize their notes better. They organize their thoughts better. And I believe that they begin to organize their lives better, too."

Leslie D. Ball, Senior Executive Professor, College of Business Administration, Northeastern University

Students and faculty members at Northeastern University's College of Business Administration are revolutionizing their research, study and classroom habits thanks to the Microsoft® Office OneNote™ 2003 digital note-taking program. OneNote enables students and educators to replace a stack of traditional notebooks with a single digital notebook that holds notes in a variety of formats—typed, handwritten, drawn, HTML, even audio. Students and teachers can then organize their notes in the way that makes the most sense to them and find all references to any given word or phrase in seconds. As a result, students find studying for exams easier, and they respond more quickly in class. Faculty members find that using OneNote lends convenience and accuracy to the academic research process thereby greatly improving their productivity. One professor says that OneNote users not only take better notes, but they also become more organized, and they adopt better study and research habits.

Microsoft Office OneNote 2003

"Using OneNote has made my studying much easier because I can search through my notes faster than with a traditional notebook. Within seconds, I can find what I'm looking for when I'm trying to study."

David Cirigliano, First-Year Student, College of Business Administration, Northeastern University

Situation

Northeastern University is a private research university, offering a comprehensive range of undergraduate and graduate programs. A world leader in practice-oriented education, Northeastern emphasizes educational programs that link classroom learning with workplace experience and that integrate professional preparation with study in the liberal arts and sciences. Northeastern's main campus is situated on 67 acres in Boston's cultural district. The university serves more than 18,500 undergraduates and 3,600 graduate students, and it hosts a faculty of more than 1,100.

Virtually every one of those students and faculty members confronts the challenges of note-taking on a weekly basis. Students and educators have to take notes everywhere—in classes, in meetings, and while conducting research. Although they need to take the most accurate and complete notes possible—passing a test or publishing a research paper depends on it—their notes are often poorly organized, difficult to read, hard to navigate, and incomplete. What's more, taking notes for various classes or research projects can require an unruly stack of notebooks.

As a result, finding the relevant content in a timely manner becomes another challenge. Not only do students and educators waste time rifling through paper notebooks for the information they need to complete an assignment, lesson plan, or research paper, they don't work nearly as efficiently as they could had they intuitively organized all their notes in one easy-to-access location. Fortunately, OneNote changes all that.

Consider Northeastern's David Wesley. A research associate in the Institute for Global Innovation Management of the College of Business Administration, Wesley is responsible for creating case studies for use by executive MBA students at the college and for distribution by Harvard Business School Publishing. Wesley researches up to 40 companies at a time. For each company, he maintains separate file folders—both digital and hardcopy—containing financial reports, news articles, interviews, and other information sources on each company.

Much of his reference material comes from Web searches—he downloads spreadsheets from an online financial information service, news stories from online archives, and a variety of other research data. Wesley then prints out the material he's gathered and files the paper copies in the appropriate company folder. In addition, he saves relevant Web pages as HTML files and stores them in Microsoft Office Word documents. The process has been cumbersome to say the least.

"My file cabinet is always full of papers," says Wesley. "Having to search for information isn't easy—it can take an hour to find a specific fact or reference, and I can never be sure I've found every reference. Even the file folders on my hard drive are cluttered. I create subfolders, call them 'old files,' and shuffle files in there so they don't get lost. I put dates in the file extensions of my documents to try to keep track of them. It's not a great system."

Leslie D. Ball, Senior Executive Professor at Northeastern's College of Business Administration, also understands the challenges of note-taking: he's been known to use a dozen yellow pads at once to keep notes on his various projects. As soon as he heard about the Microsoft Office OneNote™2003 digital note-taking program he quickly saw the benefits for himself and for Northeastern's students.

"I brought OneNote to Northeastern because I immediately saw its applicability to our note-taking needs," says Ball. "I saw how easy and

"Unlike a traditional online search, OneNote doesn't just refer me to the right document—it highlights the search word in my notes so I can't miss it. Searches that took an hour the old way take no time at all with OneNote."

David Wesley, Research Associate, College of Business Administration, Northeastern University

efficient it was to use and I knew that students would grab hold of it very quickly."

Solution

A new program in the Microsoft Office System, OneNote enables students and educators to take, organize, use, and share their notes more productively on their laptops, desktop computers, or Tablet PCs. Users can take handwritten or typed notes, sketch diagrams, collect Web page content, and record audio notes in one place—all with the flexibility to organize and use the information they gather the way they want. Users can then transfer this information to other Office programs to create research papers, lesson plans, and other formal documents.

As the Northeastern faculty and students are discovering, software specifically designed to capture and organize notes enables them to use their notes with the level of efficiency that had not existed before, making OneNote an invaluable aid to the education and research communities.

In a Microsoft-commissioned survey of university students who use the software, the overwhelming majority said it made their note-taking more productive (76 percent), enabled them to better organize their notes (72 percent), and helped them find the information they needed more quickly (69 percent). In addition, students said they found OneNote equally satisfying whether used on a desktop, laptop, or Tablet PC. And in fact, 96 percent said they would recommend OneNote to others.

Ball introduced OneNote to students and faculty at the College of Business Administration in fall 2003. That semester, 70 first-year students and 10 faculty members at the college adopted the program. In fact, Ball says that the college is so impressed with OneNote, it plans to have all first-year students use it the following academic year.

"I believe OneNote is the most effective way to take notes that I've ever seen," says Ball. "I believe that students will ultimately be much more successful if they use this technology."

Capturing Notes More Effectively

OneNote has revolutionized note-taking for users at Northeastern, including research associate David Wesley. "Now, when I find an article on the Web that I want to save, I just select it and drag and drop it directly into my OneNote folder for news articles," says Wesley. "It's a completely easy and intuitive way to capture information from Web searches. And OneNote automatically brings the URL into my notes, making it easy to revisit the Web site when I need to." From spreadsheets to executive photos and company profiles, Wesley collects text, diagrams, photos and more – and he keeps all of this data organized in OneNote.

Ball shares Wesley's enthusiasm for the product. He says OneNote is so adept at capturing the various types of high-volume information that Northeastern students and faculty manage on a weekly basis—such as information from classes, meetings, research, e-mail messages, and presentations—that he's begun using the program for all his note-taking needs, even outside the university.

Ball's students are also singing the praises of OneNote—whether they're typing class lecture content into a laptop or handwriting their notes on a Tablet PC. Ball's students especially appreciate the flexibility of OneNote – they can enter their notes anywhere on the OneNote page, they can easily combine text, diagrams, and Web content all on the same page, and they can record entire lectures using audio notes. With audio notes, Ball's students know

they've captured everything that was said during class in case their written notes are incomplete or they have a difficult time deciphering them when it's time to study for finals.

Organizing Information More Efficiently

As with the structure of a traditional notebook, OneNote offers sections and pages that students and educators can label according to their needs. But OneNote takes this structure a step further by providing users an unlimited number of sections and pages that they can customize and move around to meet ever-changing note-taking needs. Students and faculty at Northeastern point to OneNote's organizational features as one of the product's most valuable aspects.

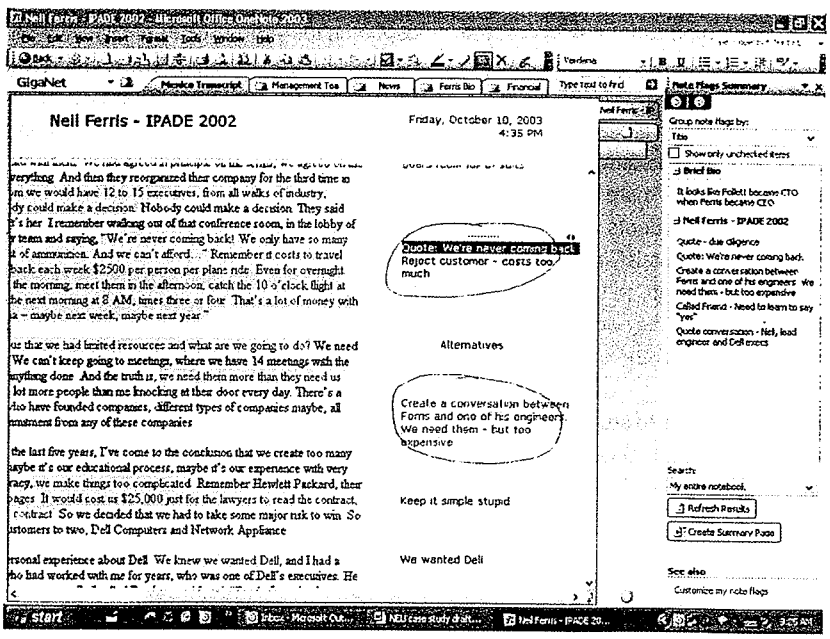
"Using OneNote, I can organize my notes by keeping each class in a separate folder," says Northeastern first-year student David Cirigliano. "And then I can organize my classes by semester. I'm better organized because I can keep all my notes in one place, and it's much easier to go back and look through my notes than it would be with regular notebooks."

Wesley finds OneNote's organizational features invaluable for his research projects. Instead of maintaining a series of notebooks and a file cabinet, he can keep tabs—literally—on each of his case studies and research projects in a single OneNote digital notebook. The page tabs on his OneNote pages make it easy for him to see all the resources he's put in a single section and to access them directly. In addition, OneNote automatically dates his resources so he can keep track of them without having to remember to include dates in the file extensions.

After taking his notes, Wesley uses many of the other OneNote features to highlight important content so he can act on it or find it more easily later.

For example, Wesley uses note flags to mark pieces of information as important or as items on which to follow up. OneNote offers a variety of symbols that can be customized per Wesley's needs to help him mark his notes so that nothing falls through the cracks. He then uses the Note Flag summary feature to pull up a comprehensive list of all of the notes he's flagged throughout his notebook so that he can begin to complete the action items associated with his notes. Wesley no longer worries about forgetting to follow up on certain things because of how simple it has become to manage his to-dos with OneNote.

Northeastern's David Wesley uses note flags to mark pieces of information as important or as items on which to follow up.



Reusing Notes

Notes aren't the end product for students and faculty, of course. At Northeastern, notes are a resource that students rely on to study for exams and write term papers, and that faculty members use to create lesson plans or develop and publish their research. Equipped with OneNote, students and faculty

"I believe OneNote is the most effective way to take notes that I've ever seen. I believe that students will ultimately be much more successful if they use this technology."

Leslie D. Ball, Senior Executive Professor, College of Business Administration, Northeastern University

become better prepared to meet these academic goals—and more productive in the process.

In addition to the organizational features that make it easier to find information, OneNote has a powerful keyword search that works across all content types. Students and educators are finding their OneNote digital notebooks and the notes they contain far more useful than the stacks of paper notebooks they once relied on. Rather than searching for a needle in a haystack and perhaps not even finding the information they need, locating the facts they need—the moment they need them—is not only a cinch, it's a pleasure.

Instead of flipping through pages and pages of paper notes, now Cirigliano types a keyword in the OneNote search box when he's looking for particular notes. OneNote then looks through his notebook and pulls up a list of pages where that search term was found. Cirigliano simply scrolls through the list to find the notes he's looking for. "Using OneNote has made my studying much easier because I can search through my notes faster than with a traditional notebook," says Cirigliano. "Within seconds, I can find what I'm looking for when I'm trying to study."

Seconding that sentiment, Wesley describes how OneNote has improved and streamlined his case study development process. "When I want to find a particular term or name in my notes, I just type it into the search box and OneNote finds all references to it, whether it's in Web copy, or typed or handwritten text. Finding all those references was virtually impossible for me before, unless I knew exactly which documents had the references. And unlike a traditional online search, OneNote doesn't just refer me to the right document—it highlights the search word in my notes so I can't miss it. Searches that took an hour the old way take no time at all with OneNote."

Benefits

Ball says that over the years, he has seen many "educational tools" that actually detract from, rather than contribute to, the process of education. OneNote, he says, is different. Clearly, OneNote is having a great impact on education at Northeastern.

For one thing, students that use OneNote in class are the first to respond when their instructors ask about information discussed previously because they can find references in their notes more quickly, according to Ball. And although the school has only been using OneNote since its debut last fall, Ball says he expects to see the note-taking program positively impact student grades.

For Wesley, the biggest benefits of OneNote are the convenience and comprehensiveness it brings to the research process. OneNote puts the information he needs right at his fingertips, eliminating the need to search through reams of paper to find relevant details.

Even more important, OneNote adds a certainty to the process of reviewing notes that didn't exist before. Now, when Wesley does a keyword search of his notes with OneNote, he is certain that he's finding all his references—in other words, the possibility of losing a small but significant reference no longer exists, as long as it's stored in OneNote.

"My ultimate goal is to have all our students using OneNote," says Ball. "Students and faculty who use OneNote organize their notes better. They organize their thoughts better. And I believe that they begin to organize their lives better, too."

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to: http://www.microsoft.com

For more information about Northeastern University products and services, visit the Web site at: http://www.neu.edu

Microsoft Office System

Microsoft® Office is the business world's chosen environment for information work that provides the software, servers, and services that help you succeed by transforming information into impact. For more information about Microsoft Office System, go to: http://www.microsoft.com/office/

Software

- Microsoft® Office 2003 Professional
- Microsoft Office OneNote™ 2003
- Microsoft Windows® XP Professional
- Microsoft Windows XP Tablet PC Edition

Hardware

- IBM ThinkPad A21
- Toshiba Portege Tablet PC
- Dell Optiplex Pentium IV

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September 9, 2004

The Tablet PC Takes Its Place in the Classroom

By THOMAS J. FITZGERALD

TABLET PC's have been around for almost two years now, and while they have not yet proved to be the revolutionary change agents that they were billed as in November 2002, they are starting to carve a niche for themselves in certain corners of the digital world.

Industries like health care and insurance have embraced tablet PC's, which can speed the processing of records and forms. While tablets, which account for only about 1 percent of the market for notebook computers, are still generally more expensive than laptops with comparable specifications, prices have started to fall. And last month, Microsoft released an updated version of its Windows XP Tablet PC operating system that offers improved handwriting recognition, addressing one of the chief complaints about the earlier version.

But perhaps the most promising area so far is in the classroom, a setting in which portable devices with handwriting capabilities would seem to make sense. Educators at a handful of schools, many of them private high schools, are pressing ahead with plans to issue students tablet PC's for use in English, foreign language, math, science and social studies classes.

At some schools, the hope is to do away with paper notebooks, on the way to eliminating as much paper as possible. In that vision, students would take tests electronically, read their textbooks online and send their homework by e-mail. Proponents say the devices can improve interaction among teachers and students and increase opportunities for critical thinking by cutting down on busywork.

One factor that favors educators is that students seem to like tablets, especially the pen-based interface that takes the place of a mouse and keyboard.

"That was undoubtedly the best and coolest part," said John Stanton, a senior last year at Cathedral Preparatory School in Erie, Pa., who took part in a pilot program to test the devices.

Mr. Stanton, 18, was on the school's debate team, and he used a tablet PC to take notes and prepare responses during debates. He said the tablet kept pace with swift handwriting

and was useful because he could quickly call up his writings from earlier rounds.

Administrators at Cathedral Prep had initially considered laptops, but switched to tablet PC's after early testing by staff members. "We did not want to get caught up with the novelty of this thing," said the Rev. Scott W. Jabo, headmaster at Cathedral Prep. "The more we were using it, we saw a lot of practical uses."

Cathedral Prep issued tablet PC's to 160 ninth graders when they started classes this month, with the goal of eliminating paper notebooks and centralizing study materials on a device linked to the school's wireless network. The device chosen by the school, a model from Acer, has a 10-inch screen and weighs about three pounds. Like most consumer tablets, it includes a standard keyboard and can function as a laptop when the screen is repositioned.

School officials said they paid $1,350 per device, which included volume and education discounts. Students will be charged a technology fee, to be added to tuition over four years, to cover the cost of the device plus warranties, software and a book bag.

Tablet PC's run essentially the same Windows-based programs as other computers. But instead of a mouse, there is a stylus, or pen, that can be used for navigation by touching the screen. The pen also can take the place of the keyboard; users can handwrite directly in programs, using an on-screen input panel, or by tapping letters and numbers on an on-screen keyboard. Programs designed specifically for the tablet PC, like Microsoft's Windows Journal, enable freeform handwriting that can be converted to text or saved in the original "digital ink" format.

Beyond using them for taking notes and reading, some schools have developed detailed plans to integrate tablet PC's into their curriculums. At the Benjamin School, a private day school in North Palm Beach, Fla., eighth graders tested the devices last year in history and English, while teachers had their own units so they could explore ways to integrate them in all subjects.

This year all ninth graders at the school, about 100 students, will be using their own tablets, a model from Gateway with a 14-inch screen, in all of their classes. The school has a new campus with a wireless network; students and teachers will have access to collaborative software, interactive whiteboards at the front of the class and classroom management tools, as well as the Internet and personal file-storage space.

Using Tablet PC's in allows teachers to go beyond conventional teaching methods, said Barbara Murphy, co-chair of the school's technology committee and a 10th-grade chemistry teacher. Instead of standing at the front of the classroom and talking, Ms. Murphy said, teachers can oversee students' work on projects. "We want students to be actively involved," she said. "The tablet PC seems to really facilitate that."

For example, using one piece of software, a peer-to-peer program called Groove Virtual Office from Groove Networks, students and teachers can collaborate on projects in the

classroom from home or anywhere there is an Internet connection. The program, geared mainly for businesses, also has features designed for tablet PC's.

Using Groove in a math class, for example, a teacher could write out an equation in a shared workspace that is displayed on the classroom's whiteboard, and students seated at their desks can use their tablet pens to take turns adding steps to it. "It's like having 20 kids standing at a blackboard, each with chalk in their hands," said Ken Didsbury, academic dean and an English teacher at the Benjamin School.

Students who tested the devices last year said the pen capabilities were sufficient for note-taking. "It writes just like a pen and paper," said Shohan Shetty, 14, who is entering the ninth grade this year. "It's fast."

William Fraser, 14, also used the device last year. He said a strong feature was having Internet access at his desk for fast research. William also said he found the pen to be useful. "About half the class wrote with the pen because they weren't completely used to typing," he said. "And if you want to make a diagram, you just draw with it."

Classroom management software also figures in the Benjamin plan. Using a program called SynchronEyes, from Smart Technologies, teachers can poll students anonymously to determine if subject matter is being understood. Teachers can also view the students' screens to catch instant messaging or to administer electronic testing. "It's a little Big Brotherish, but it allows us to be sure that when we give a test electronically, the kids can't cheat," Mr. Didsbury added.

Students were required to purchase the tablets before the start of the school year; the cost was $1,925 plus $167 for insurance, school officials said. The price, which the school negotiated with Gateway after comparing three manufacturers' offerings, included bundled software like Microsoft Office 2003, Microsoft OneNote and an antivirus program.

Teachers say they feel energized by the challenges and opportunities presented by tablet PC's. Linda Willich, a social studies teacher at the Benjamin School, is preparing a new system for students to organize their work. She says she is looking forward to the collaboration tools and pen capabilities for drawing graphs.

"I can see huge possibilities for it, especially in economics," she said. "There are all kinds of things we haven't even anticipated that will not only be challenges, but will be exciting."

Microsoft

Trustworthy Computing

Microsoft White Paper

Craig Mundie – Senior Vice President and CTO, Advanced Strategies and Policy
Pierre de Vries
Peter Haynes
Matt Corwine
Microsoft Corporation

October 2002

The following is a revised version of the paper on Trustworthy Computing we published in January 2002. It represents our synthesis of the vast amount of valuable input we have received on the subject since the original paper saw the light of day. To everyone who offered their thoughts and help: many thanks.

Why Trust?

While many technologies that make use of computing have proven themselves extremely reliable and trustworthy—computers helped transport people to the moon and back, they control critical aircraft systems for millions of flights every year, and they move trillions of dollars around the globe daily—they generally haven't reached the point where people are willing to entrust them with their lives, implicitly or explicitly. Many people are reluctant to entrust today's computer systems with their personal information, such as financial and medical records, because they are increasingly concerned about the security and reliability of these systems, which they view as posing significant societal risk. If computing is to become truly ubiquitous—and fulfill the immense promise of technology—we will have to make the computing ecosystem sufficiently *trustworthy* that people don't worry about its fallibility or unreliability the way they do today.

Trust is a broad concept, and making something trustworthy requires a social infrastructure as well as solid engineering. All systems fail from time to time; the legal and commercial practices within which they're embedded can compensate for the fact that no technology will ever be perfect.

Hence this is not only a struggle to make software trustworthy; because computers have to some extent already lost people's trust, we will have to overcome a legacy of machines that fail, software that fails, and systems that fail. We will have to persuade people that the systems, the software, the services, the people, and the companies have all, collectively, achieved a new level of availability, dependability, and confidentiality. We will have to overcome the distrust that people now feel for computers.

The *Trustworthy Computing Initiative* is a label for a whole range of advances that have to be made for people to be as comfortable using devices powered by computers and software as they are today using a device that is powered by electricity. It may take us ten to fifteen years to get there, both as an industry and as a society. This is a "sea change" not only in the way we write and deliver software, but also in the way our society views computing generally. There are immediate problems to be solved, and fundamental open research questions. There

are actions that individuals and companies can and should take, but there are also problems that can only be solved collectively by consortia, research communities, nations, and the world as a whole.

Setting the Stage

History

Society has gone through a number of large technology shifts that have shaped the culture: the agrarian revolution, the invention of metalworking, the industrial revolution, the advent of electricity, telephony and television—and, of course, the microprocessor that made personal computing a reality. Each of these fundamentally transformed the way billions of people live, work, communicate, and are entertained.

Personal computing has so far only really been deployed against white-collar work problems in the developed world. (Larger computer systems have also revolutionized manufacturing processes.) However, the steady improvement in technology and lowering of costs means that personal computing technology will ultimately become a building block of everybody's home and working lives, not just those of white-collar professionals.

Progress in computing in the last quarter century is akin to the first few decades of electric power. Electricity was first adopted in the 1880s by small, labor-intensive businesses that could leverage the technology's fractional nature to increase manufacturing productivity (that is, a single power supply was able to power a variety of electric motors throughout a plant). In its infancy, electricity in the home was a costly luxury, used by high-income households largely for powering electric lights. There was also a good deal of uncertainty about the safety of electricity in general and appliances in particular. Electricity was associated with lightning, a lethal natural force, and there were no guarantees that sub-standard appliances wouldn't kill their owners.

Between 1900 and 1920 all that changed. Residents of cities and the fast-growing suburbs had increasing access to a range of energy technologies, and competition from gas and oil pushed down electricity prices. A growing number of electric-powered, labor-saving devices, such as vacuum cleaners and refrigerators, meant that households were increasingly dependent on electricity. Marketing campaigns by electricity companies and the emergence of standards marks (for example, Underwriters' Laboratories (UL) in the United States) allayed consumer fears. The technology was not wholly safe or reliable, but at some point in the first few years of the 20th century, it became safe and reliable enough.

In the computing space, we're not yet at that stage; we're still in the equivalent of electricity's 19th century industrial era. Computing has yet to touch and improve every facet of our lives—but it will. It is hard to predict in detail the eventual impact that computing will have, just as it was hard to anticipate the consequences of electricity, water, gas, telecommunications, air travel, or any other innovation. A key step in getting computing to the point where people would be as happy to have a microprocessor in every device as they are relying on electricity will be achieving the same degree of relative trustworthiness. "Relative," because 100% trustworthiness will never be achieved by any technology—electric power supplies surge and fail, water and gas pipes rupture, telephone lines drop, aircraft crash, and so on.

Trustworthy Technologies in General

All broadly adopted technologies—like electricity, automobiles or phones—have become trusted parts of our daily lives because they are almost always there when we need them, do what we need them to do, and work as advertised.

Almost anyone in the developed world can go buy a new telephone handset and plug it into the phone jack without worrying about whether it'll work or not. We simply assume that we'll get a dial tone when we pick up a phone, and that we'll be able to hear the other party when we connect. We assume that neither our neighbor nor the insurance

broker down the road will be able to overhear our conversation, or obtain a record of who we've been calling. And we generally assume that the phone company will provide and charge for their service as promised. A combination of engineering, business practice, and regulation has resulted in people taking phone service for granted.

One can abstract three broad classes of expectations that users have of any trustworthy technology: safety, reliability, and business integrity (that is, the integrity of the organization offering the technology). These categories, and their implications for computing, are discussed in more detail below.

Trustworthy Computing

Computing devices and information services will only be truly pervasive when they are so dependable that we can just forget about them. In other words, at a time where computers are starting to find their way into just about every aspect of our life, we need to be able to trust them. Yet the way we build computers, and the way that we now build services around those computers, hasn't really changed that much in the last 30 or 40 years. It will need to.

A Framework for Trustworthy Computing

We failed to find an existing taxonomy that could provide a framework for discussing Trustworthy Computing. There is no shortage of trust initiatives, but the focus of each is narrow. For example, there are treatments of trust in e-commerce transactions and trust between authentication systems, and analyses of public perceptions of computing, but a truly effective approach needs to integrate engineering, policy, and user attitudes. Even just on the engineering side, our scope is broader than, say, the SysTrust/SAS70 models, which deal purely with large online systems.

First, there are the machines themselves. They need to be reliable enough that we can embed them in all kinds of devices—in other words, they shouldn't fail more frequently than other similarly important technologies in our lives. Then there's the software that operates those machines: do people trust it to be equally reliable? And finally there are the service components, which are also largely software-dependent. This is a particularly complicated problem, because today we have to build dependability into an end-to-end, richly interconnected (and sometimes federated) system.

Since trust is a complex concept, it is helpful to analyze the objective of Trustworthy Computing from a number of different perspectives. We define three dimensions with which to describe different perspectives on trust: Goals, Means, and Execution.

Goals

The *Goals* consider trust from the user's point of view. The key questions are: Is the technology there when I need it? Does it keep my confidential information safe? Does it do what it's supposed to do? And do the people who own and operate the business that provides it always do the right thing? These are the goals that any Trustworthy Computing has to meet:

Goals	**The basis for a customer's decision to trust a system**
Security	The customer can expect that systems are resilient to attack, and that the confidentiality, integrity, and availability of the system and its data are protected.
Privacy	The customer is able to control data about themselves, and those using such data adhere to fair information principles

Reliability	The customer can depend on the product to fulfill its functions when required to do so.
Business Integrity	The vendor of a product behaves in a responsive and responsible manner.

The trust Goals cover both rational expectations of performance—that is, those that are amenable to engineering and technology solutions—and more subjective assessments of behavior that are the result of reputation, prejudice, word of mouth, and personal experience. All of these goals raise issues relating to engineering, business practices, and public perceptions, although not all to the same degree. In order to clarify terms, here are examples for the *Goals*:

- Security: A virus doesn't infect and crash my PC. An intruder cannot render my system unusable or make unauthorized alterations to my data.
- Privacy: My personal information isn't disclosed in unauthorized ways. When I provide personal information to others, I am clearly informed of what will—and won't—be done with it, and I can be sure they will do what they promise.
- Reliability: When I install new software, I don't have to worry about whether it will work properly with my existing applications. I can read my email whenever I want by clicking the Hotmail link on msn.com. I never get "system unavailable" messages. The Calendar doesn't suddenly lose all my appointments.
- Business Integrity: My service provider responds rapidly and effectively when I report a problem.

Means

Once the Goals are in place, we can look at the problem from the industry's point of view. *Means* are the business and engineering considerations that are employed to meet the Goals; they are the nuts and bolts of a trustworthy service. Whereas the Goals are largely oriented towards the end-user, the Means are inwardly facing, intra-company considerations. Think of the Goals as *what* is delivered, and the Means as *how*.

Means	**The business and engineering considerations that enable a system supplier to deliver on the Goals**
Secure by Design, Secure by Default, Secure in Deployment	Steps have been taken to protect the confidentiality, integrity, and availability of data and systems at every phase of the software development process—from design, to delivery, to maintenance.
Fair Information Principles	End-user data is never collected and shared with people or organizations without the consent of the individual. Privacy is respected when information is collected, stored, and used consistent with Fair Information Practices.
Availability	The system is present and ready for use as required.
Manageability	The system is easy to install and manage, relative to its size and complexity. (Scalability, efficiency and cost-effectiveness are considered to be part of manageability.)
Accuracy	The system performs its functions correctly. Results of calculations are

	free from error, and data is protected from loss or corruption.
Usability	The software is easy to use and suitable to the user's needs.
Responsiveness	The company accepts responsibility for problems, and takes action to correct them. Help is provided to customers in planning for, installing and operating the product.
Transparency	The company is open in its dealings with customers. Its motives are clear, it keeps its word, and customers know where they stand in a transaction or interaction with the company.

Some examples:

- Secure by Design: An architecture might be designed to use triple-DES encryption for sensitive data such as passwords before storing them in a database, and the use of the SSL protocol to transport data across the Internet. All code is thoroughly checked for common vulnerabilities using automatic or manual tools. Threat modeling is built into the software design process.
- Secure by Default: Software is shipped with security measures in place and potentially vulnerable components disabled.
- Secure by Deployment: Security updates are easy to find and install—and eventually install themselves automatically—and tools are available to assess and manage security risks across large organizations.
- Privacy/Fair Information Principles: Users are given appropriate notice of how their personal information may be collected and used; they are given access to view such information and the opportunity to correct it; data is never collected or shared without the individual's consent; appropriate means are taken to ensure the security of personal information; external and internal auditing procedures ensure compliance with stated intentions.
- Availability: The operating system is chosen to maximize MTBF (Mean Time Between Failures). Services have defined and communicated performance objectives, policies, and standards for system availability.
- Manageability: The system is designed to be as self-managing as practicable. Hotfixes and software updates can be installed with minimal user intervention.
- Accuracy: The design of a system includes RAID arrays, sufficient redundancy, and other means to reduce loss or corruption of data.
- Usability: The user interface is uncluttered and intuitive. Alerts and dialog boxes are helpful and appropriately worded.
- Responsiveness: Quality-assurance checks occur from early on in a project. Management makes it clear that reliability and security take precedence over feature richness or ship date. Services are constantly monitored and action is taken whenever performance doesn't meet stated objectives.
- Transparency: Contracts between businesses are framed as win-win arrangements, not an opportunity to extract the maximum possible revenue for one party in the short term. The company communicates clearly and honestly with all its stake holders.

Execution

Execution is the way an organization conducts its operations to deliver the components required for Trustworthy Computing. There are three aspects to this: Intents, Implementation, and Evidence. Intents are the corporate and

legislative guidance that sets requirements for the design, implementation, and support of the product. Implementation is the business process that operationalizes the Intents. Evidence is the mechanism by which we verify that the Implementation has delivered on the Intent. Some examples:

Intents	• Company policies, directives, benchmarks, and guidelines • Contracts and undertakings with customers, including Service Level Agreements (SLAs) • Corporate, industry and regulatory standards • Government legislation, policies, and regulations
Implementation	• Risk analysis • Development practices, including architecture, coding, documentation, and testing • Training and education • Terms of business • Marketing and sales practices • Operations practices, including deployment, maintenance, sales & support, and risk management • Enforcement of intents and dispute resolution
Evidence	• Self-assessment • Accreditation by third parties • External audit

This problem can only be tackled by working on two parallel tracks.

The first track is the immediate problems—what people read and worry about every day. We need to address known current problems and mitigate currently known weaknesses. This is also a way to learn about the more fundamental problems. We need to be as well-informed as we can about what is really going on and what we can and cannot fix within the constraints of the current systems.

Part of the reason for customer anxiety is that personal computers are now entering areas that they didn't previously worry about. It will be easiest to focus on areas like banking or banking services where such problems are well known and of long standing.

While there is a lot of work to be done through incrementally improving current systems, these efforts will not solve the fundamental problems, some of which are described in the next section.

The computer industry needs to identify and solve the most critical challenges, and fold the solutions in an incremental way into the huge legacy systems that have been built. There will be long technological replacement cycle during which the critical infrastructure systems that society depends on are gradually upgraded to a new and improved status. If these systems already exist, people are not just going to throw them out the window and start over from scratch. So we have to identify critical infrastructure and systems weaknesses and upgrade them on a high-priority basis, and ensure that new infrastructures are built on sound principles.

Fundamental Problems

Policy

Once a technology has become an integral part of how society operates, that society will be more involved in its evolution and management. This has happened in railways, telecommunications, TV, energy, etc. Society is only now coming to grips with the fact that it is critically dependent on computers.

We are entering an era of tension between the entrepreneurial energy that leads to innovation and society's need to regulate a critical resource despite the risk of stifling competition and inventiveness. This is exacerbated by the fact that social norms and their associated legal frameworks change more slowly than technologies. The computer industry must find the appropriate balance between the need for a regulatory regime and the impulses of an industry that has grown up unregulated and relying upon *de facto* standards.

Many contemporary infrastructure reliability problems are really policy issues. The state of California's recent electricity supply crisis was triggered largely by a bungled privatization. The poor coverage and service of US cellular service providers is due in part to the FCC's policy of not granting nationwide licenses. These policy questions often cross national borders, as illustrated by the struggle to establish global standards for third-generation cellular technologies. Existing users of spectrum (often the military) occupy different bands in different countries, and resist giving them up, making it difficult to find common spectrum worldwide.

Processing

Complexity

We are seeing the advent of mega-scale computing systems built out of loose affiliations of services, machines, and application software. The emergent (and very different) behavior of such systems is a growing long-term risk.

An architecture built on diversity is robust, but it also operates on the edge of chaos. This holds true in all very-large-scale systems, from natural systems like the weather to human-made systems like markets and the power grid. All the previous mega-scale systems that we've built—the power grid, the telephone systems—have experienced unpredicted emergent behavior. That is why in 1965 the power grid failed and rippled down the whole East Coast of the United States, and that's why whole cities occasionally drop off the telephone network when somebody implements a bug fix on a single switch. The complexity of the system has outstripped the ability of any one person—or any single entity—to understand all of the interactions.

Incredibly secure and trustworthy computer systems exist today, but they are largely independent, single-purpose systems that are meticulously engineered and then isolated. We really don't know what's going to happen as we dynamically stitch together billions—perhaps even trillions—of intelligent and interdependent devices that span many different types and generations of software and architectures.

As the power of computers increase, in both storage and computational capacity, the absolute scale, and complexity of the attendant software goes up accordingly. This manifests itself in many ways, ranging from how you administer these machines to how you know when they are broken, how you repair them, and how you add more capability. All these aspects ultimately play into whether people perceive the system as trustworthy.

Hardware, Redundancy

We don't yet have really good economical, widely used mechanisms for building ultra-reliable hardware. However, we do have an environment where it may become common-place to have 200+ million transistors on a single chip. At some point it becomes worthwhile to make that into four parallel systems that are redundant and therefore more resistant to failure. The marginal cost of having this redundancy within a single component may be acceptable. Similarly, a computer manufacturer or end user may choose to install two smaller hard drives to mirror their data, greatly improving its integrity in the event of a disk crash.

We may have new architectural approaches to survivability in computer systems these days, but it always comes from redundancy. This means you have to buy that redundancy. So people will, in fact, again have to decide: Do

they want to save money but potentially deal with more failure? Or are they willing to spend more money or deal with more complexity and administrative overhead in order to resolve the appropriate aspects of security, privacy, and technological sufficiency that will solve these problems?

Machine-to-Machine Processes

The Web Services model is characterized by computing at the edge of the network. Peer-to-peer applications will be the rule, and there will be distributed processing and storage. An administrative regime for such a system requires sophisticated machine-to-machine processes. Data will be self-describing. Machines will be loosely coupled, self-configuring, and self-organizing. They will manage themselves to conform to policy set at the center.

Web applications will have to be designed to operate in an asynchronous world. In the PC paradigm, a machine knows where its peripherals are; the associations have been established (by the user or by software) at some point in the past. When something disrupts that synchronicity, the software sometimes simply hangs or dies. Improved plug-and-play device support in Windows XP and "hot-pluggable" architectures such as USB and IEEE 1394 point the way toward a truly "asynchronous" PC, but these dependencies do still exist at times.

On the Web, however, devices come and go, and latency is highly variable. Robust Web architectures need dynamic discoverability and automatic configuration. If you accept the idea that everything is loosely coupled and asynchronous, you introduce even more opportunities for failure. For every potential interaction, you have to entertain the idea that it won't actually occur, because the Web is only a "best-effort" mechanism—if you click and get no result, you click again. Every computing system therefore has to be redesigned to recover from failed interactions.

Identity

Questions of identity are sometimes raised in the context of Trustworthy Computing. Identity is not explicitly called out in the framework, because a user does not expect a computer system to generate their identity. However, user identity is a core concept against which services are provided. Assertions of identity (that is, authentication) need to be robust, so that taking actions that depend on identity (that is, authorization) can be done reliably. Hence, users expect their identities to be safe from unwanted use.

Identity is difficult to define in general, but particularly so in the digital realm. We use the working definition that identity is the persistent, collective aspects of a set of distinguishing characteristics by which a person (or thing) is recognizable or known. Identity is diffuse and context-dependent because these aspect "snippets" are stored all over the place in digital, physical, and emotional form. Some of this identity is "owned" by the user, but a lot of it is conferred by others, either legally (for example, by governments or companies) or as informal social recognition.

Many elements of Trustworthy Computing systems impinge on identity. Users worry about the privacy of computer systems in part because they realize that seemingly unrelated aspects of their identity can be reassembled more easily when the snippets are in digital form. This is best evidenced by growing public fear of credit-card fraud and identity theft as a result of the relative transparency and anonymity of the Internet versus offline transactions, even though both crimes are equally possible in the physical world. Users expect that information about themselves, including those aspects that make up identity, are not disclosed in unapproved ways.

People

It's already challenging to manage extremely large networks of computers, and it's just getting harder. The immensity of this challenge has been masked by the fact that up to this point we have generally hired professionals to manage large systems. The shortcomings of the machines, the networks, the administration, the tools, and the applications themselves are often mitigated by talented systems managers working hard to compensate for the fact that these components don't always work as expected or desired.

Many of the system failures that get a lot of attention happen because of system complexity. People make an administrator error, fail to install a patch, or configure a firewall incorrectly, and a simple failure cascades into a catastrophic one. There is a very strong dependency on human operators doing the right thing, day in and day out.

There are already too few knowledgeable administrators, and we're losing ground. Worse, the needs of administration are evolving beyond professional IT managers. On the one hand we are at the point where even the best operators struggle: systems are changing too rapidly for people to comprehend. On the other, the bulk of computers will eventually end up in non-managed environments that people own, carry around with them, or have in their car or their house.

We therefore need to make it easier for people to get the right thing to happen consistently with minimal human intervention. We must aim towards a point where decision-makers can set policy and have it deployed to thousands of machines without significant ongoing effort in writing programs, pulling levers, and pushing buttons on administrators' consoles.

The industry can address this in any of a number of ways. Should we actually write software in a completely different way? Should we have system administrators at all? Or should we be developing machines that are able to administer other machines without routine human intervention?

Programming

Tools

Each of these approaches requires new classes of software. As the absolute number and complexity of machines goes up, the administration problem outstrips the availability and capability of trained people.

The result is that people in the programming-tools community are going to have to think about developing better ways to write programs. People who historically think about how to manage computers are going to have to think about how computers can become more self-organizing and self-managing.

We need to continue to improve programming tools, because programming today is too error-prone. But current tools don't adequately support the process because of the number of abstraction layers that require foreground management. In other words, the designer needs not only to consider system architecture and platform/library issues, but also everything from performance, localization, and maintainability to data structures, multithreading and memory management. There is little support for programming in parallel, most control structures are built sequentially and the entire process is painfully sequential. And that is just in development; at the deployment level it is incredibly difficult to test for complex interactions of systems, versions, and the huge range in deployment environments. There is also the increasing diffusion of tools that offer advanced development functionality to a wider population but do not help novice or naive users write good code. There are also issues around long-term perspectives: for example, tools don't support "sunset-ing" or changing trends in capability, storage, speed, and so on. Think of the enormous effort devoted to Y2K because programmers of the 1960s and 1970s did not expect their code would still be in use on machines that far outstripped the capabilities of the machines of that era.

Interoperability

The growth of the Internet was proof that interoperable technologies—from TCP/IP to HTTP—are critical to building large-scale, multipurpose computing systems that people find useful and compelling. (Similarly, interoperable standards, enforced by technology, policy or both, have driven the success of many other technologies, from railroads to television.) It is obvious and unavoidable that interoperable systems will drive computing for quite some time.

But interoperability presents a unique set of problems for the industry, in terms of technologies, policies and business practices. Current "trustworthy" computing systems, such as the air-traffic-control network, are very

complex and richly interdependent, but they are also engineered for a specific purpose, rarely modified, and strictly controlled by a central authority. The question remains whether a distributed, loosely organized, flexible, and dynamic computing system—dependent on interoperable technologies—can ever reach the same level of reliability and trustworthiness.

Interoperability also poses a problem in terms of accountability and trust, in that responsibility for shortcomings is more difficult to assign. If today's Internet—built on the principle of decentralization and collective management—were to suffer some kind of massive failure, who is held responsible? One major reason why people are reluctant to trust the Internet is that they can't easily identify who is responsible for its shortcomings – who would you blame for a catastrophic network outage, or the collapse of the Domain Name System? If we are to create and benefit from a massively interoperable (and interdependent) system that people can trust, we must clearly draw the lines as to who is accountable for what.

Conceptual models

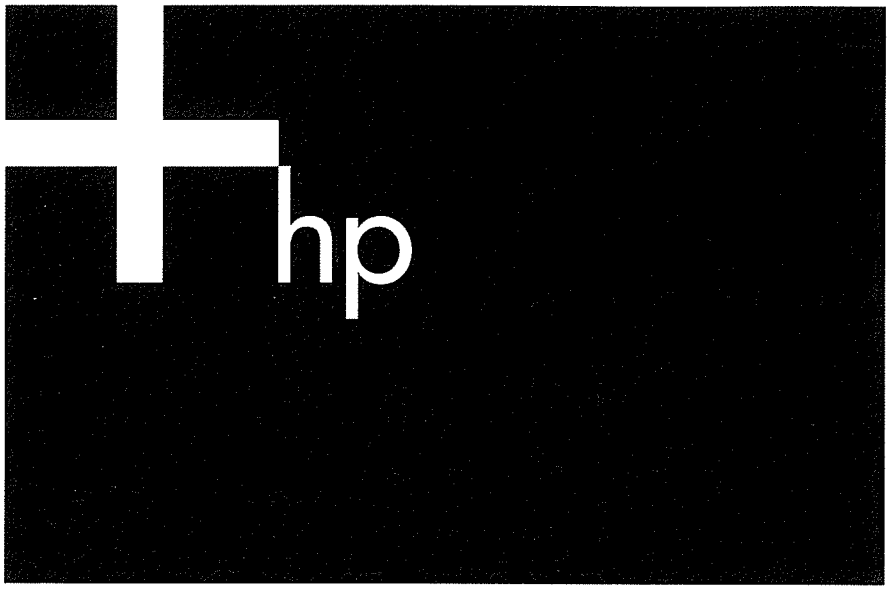
We face a fundamental problem with Trustworthy Computing: computer science lacks a theoretical framework. Computer security—itself just one component of Trustworthy Computing—has largely been treated as an offshoot of communications security, which is based on cryptography. Cryptography has a solid mathematical basis, but is clearly inadequate for addressing the problems of trusted systems. As Microsoft researcher Jim Kajiya has put it, "It's as if we're building steam engines but we don't understand thermodynamics." The computer-science community has not yet identified an alternative paradigm; we're stuck with crypto. There may be research in computational combinatorics, or a different kind of information theory that seeks to study the basic nature of information transfer, or research in cooperative phenomena in computing, that may eventually form part of an alternative. But, today this is only speculation.

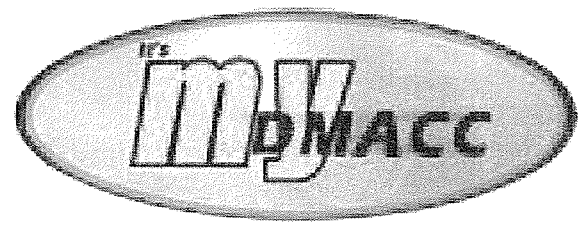
A computing system is only as trustworthy as its weakest link. The weakest link is all too frequently human: a person producing a poor design in the face of complexity, an administrator incorrectly configuring a system, a business person choosing to deliver features over reliability, or a support technician falling victim to impostors via a "social engineering" hack. The interaction between sociology and technology will be a critical research area for Trustworthy Computing. So far there is hardly any cross-fertilization between these fields.

Summary

- Delivering Trustworthy Computing is essential not only to the health of the computer industry, but also to our economy and society at large.
- Trustworthy Computing is a multi-dimensional set of issues. All of them accrue to four goals: Security, Privacy, Reliability, and Business Integrity. Each demands attention.
- While important short-term work needs to be done, hard problems that require fundamental research and advances in engineering will remain.
- Both hardware and software companies, as well as academic and government research institutions, need to step up to the challenge of tackling these problems.

Community college leverages Microsoft SharePoint™ software, HP infrastructure to create multi-campus educational portal





"The portal provides amazing opportunities for communication within the college and as an outreach tool. It changed the way we look at what we do, from the smallest to the largest and most important tasks."

— Ann Watts, Instructional Design Coordinator and Portal Project Manager, DMACC

An educational portal at Des Moines Area Community College, built with Microsoft SharePoint™ software and running on HP servers and storage systems, may ultimately transform the entire educational experience there. "It's all about making education accessible to everyone, anytime, anywhere," explained Ann Watts, instructional design coordinator and portal project manager at DMACC.

Des Moines Area Community College is a public institution with six campuses. It serves some 22,000 students taking college courses with 75 career-oriented degree programs, and 50,000 taking continuing education courses.

The portal — known as "my.dmacc" to users — is an outgrowth of the college's educational mobility initiative that runs on HP ProLiant servers. DMACC has implemented a system-wide wireless system to support both academic programs and administrative needs. Watts' mission of helping faculty to use new technology led her to a search for tools that are easy to use, hardware independent, and affordable. That led her to SharePoint software.

"The power of SharePoint is as much in its possibilities as in its technology," she said. "It provides amazing opportunities for communication within the college and as an outreach tool. Even before our district-wide implementation, the portal changed the way we look at what we do, from the smallest to the largest and most important tasks."

Far-reaching vision

Watts' vision for the portal is as boundless as her enthusiasm for it. She sees the portal as a communication tool that will link faculty to students, department to department, administration to faculty, and campus to campus. It will serve as a tool for faculty to manage their courses better, while providing a central depository for course-related materials. And it will enable DMACC to reach out to various publics — "from pre-K to gray" — establishing new connections with the community and potential students.

Microsoft

hp invent

"We've standardized on HP as a platform to keep the manageability of hardware simple and efficient. HP has helped us develop the portal with scalability in place so that as it grows and evolves, we have the ability to adapt as needed."

—Greg Martin, Chief Information Officer, Des Moines Area Community College

Among the components:

- Departmental sites for collaboration and document sharing. The Shared Documents function makes it easy to edit and collaborate on writings, and provides instant communication to link departments that span multiple campuses.
- Resources to promote "best practices" for faculty. Academic departmental sites will include sample syllabi and assignments, so that new instructors will have examples to follow for their own courses.
- Class sites that include announcements, events, pertinent web links, discussion lists, a documents area where students can collaborate on projects and where the instructor can post lecture notes, PowerPoint slides, and other information to enrich the learning experience. Class sites might also include an electronic "drop box" for assignments, and a flash chat option for instant communication between faculty and students.
- Specialized sites for collaboration with colleagues outside the institution. DMACC partners with other community colleges and often co-presents at national conferences. These special areas, with built-in discussion/chat features, allow instant communication about the document being edited.
- A "Kids College" portal to serve elementary and middle school aged children. Content might include information about journalism camp, fun days, summer enrichment programs and more.
- A portal dedicated to high school shared programs. Watts envisions a dynamic communication tool that will give students access to state documents, regulations, guidelines for post-secondary enrollment options; and facilitate interaction and make them all feel more a part of the college.
- A senior citizen portal for DMACC's "Community Connections" program. Specialized information about genealogy, health care, creating a family history archive, winterizing the family home, and other topics could easily be added to this special portal area.

Easy to use

As with any new technology, ease of use is paramount to ensure widespread acceptance. Basic computer skills are assumed. But beyond that, Watts' team of three programmers has developed content that specifically targets faculty and students in a way that makes it simple for the user.

For students, there is a game-based online orientation. It exposes them to different parts of the portal and how-to access resources. Also, a page of links to often-used downloads — Acrobat Reader, PowerPoint viewer, etc. — ensures that students and faculty alike find a plug-in they may need for a course.

For faculty, there's an "instructors' toolbox" with links to pages on using Microsoft Front Page® (so they can build their own web pages on the portal), techniques for teaching online, using the iPAQ Pocket PC, pedagogy for web-based instruction, and more. The instructors' area also includes other resources, including the faculty handbook and guidance on DMACC policies and procedures.

Hardware independence

One of Watts' greatest concerns was finding a tool that was truly hardware independent. "We've had a lot of help from people at HP to support the mobility initiative. While we don't know exactly what the future will be, HP is working with us on various device options." In the pilot implementation of my.dmacc, the school made HP iPAQ Pocket PCs and e-books available to students to support collaborative projects. More recently, the portal team has been working with HP Tablet PCs, which seem to be favored by faculty. Even high-end cell phone/PDA hybrids are seen as potential links to the portal.

"That's one of the things we really like about SharePoint — it's hardware agnostic," Watts said. "It works with iPAQs, cell phones, tablet PCs ... virtually anything that can surf the web. It all fits into the idea of making education accessible to everyone, anytime, anywhere."

Adaptive Enterprise infrastructure from HP
The portal runs on three HP ProLiant servers and will incorporate an HP Storage Area Network, in a hardware architecture designed to accommodate growth and flexibility, as well as high availability.

"We've standardized on HP as a platform to keep the manageability of hardware simple and efficient. We're able to proactively develop new ways of working and new tools for students and educators such as this new portal," said Greg Martin, CIO at DMACC. "HP has helped us develop the portal with scalability in place so that as it grows and evolves, we have the ability to adapt as needed."

Watts expects demand to grow. "I anticipate this taking more and more resources as students want to do more and more and we want the ability to adapt to demand."

The storage area network, in addition to providing storage for faculty and administrative users to post content, will provide space for each student. "Why put things on a personal hard drive when, if it's on the portal, they can access it anytime, anywhere?" Watts asked rhetorically. "That's just one example of how the portal will change the way people use technology."

Using the portal that way, though, assumes high availability. Watts said other course management systems she has encountered have had problems delivering uptime. "So we are building in both redundancy and disaster recovery, having started with a two-server model that will grow to four servers in a few months."

DMACC's initial out-of-pocket investment was $19,000 in hardware costs and $1200 for a SharePoint server license. That compares favorably, Watts noted, to other systems that called for a $90,000 hardware investment and up to $100,000 for software. Value for investment is always an important consideration, she explained.

Advice to peers
Watts is already collaborating with other colleges interested in establishing their own SharePoint portals. Among her advice:

- Standardize user software (DMACC has opted for Microsoft® Office because it integrates so well with SharePoint) and Server OS software before you begin to build the portal.
- Do some soul-searching. Ask "How does this technology help our students, our faculty and staff?" Stick to what supports your mission.
- Consider the total investment needed to launch the portal, and whether it is the best investment of limited funds. Project the ongoing consequences and costs (people, time and upgrades).
- Don't jump on every new technology bandwagon. But be fearless in applying carefully selected technologies.

"We're finding users all have their own ideas about how my.dmacc can be useful to them," Watts said. "The portal is a resource that sparks all kinds of creative ideas about how to improve the educational experience."

For more information on the SharePoint portal at DMACC, visit http://www.dmacc.edu/instructors/alwatts

At a glance

Organization: Des Moines Area Community College

Founded: 1965

Location: Des Moines, Iowa

Students: 22,000

Telephone: 800-362-2127

URL: http://www.dmacc.edu

Primary mission: Des Moines Area Community College anticipates student and community needs, providing quality, learner-centered higher education and workforce development. Its programs and services encourage and develop career success, cultural understanding, social enrichment and life-long learning.

Challenge

- Deliver an all-encompassing education portal for students, faculty and community serving a multi-campus system
- Provide for scalability to grow the portal's functionality as more users and applications are added
- Ensure high availability
- Allow wireless access

Solution

- Microsoft SharePoint™ software
- HP ProLiant servers
- HP Storage Area Network
- HP iPAQ Pocket PCs
- HP Tablet PCs

Results

- Improved communication across departments, campuses
- Improved access to course materials
- Productivity-enhancing course management system
- Collaborative workspace for students, faculty
- New links to local community, other educational institutions

For more information on how working with HP can benefit you, contact your local HP service representative, or visit http://www.hp.com

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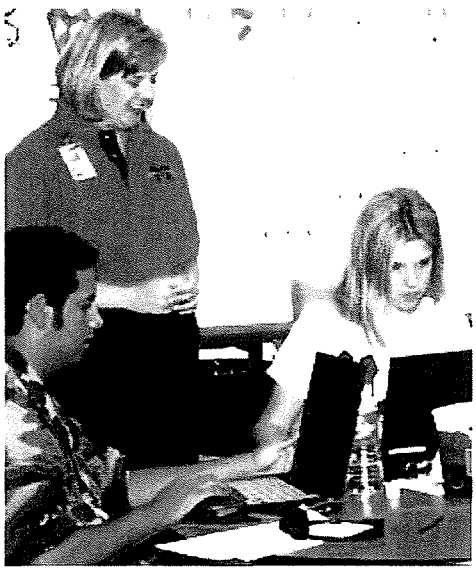
Irving Independent School District

At a Glance

District Size: 31,000
Per Student Technology Spend: $542
Percentage of Students on Free and Reduced Lunch: 61%
Contact: Jennifer Anderson
Mailing address: 901 N. O'Connor, Irving, TX 75061
URL: http://www.irvingisd.net

IRVING
Independent School District



Irving ISD has worked hard to provide a technology infrastructure that maximizes opportunities for district-wide projects. Each campus has distance-learning connections, three to five computers per classroom, computer labs, a campus technician, and an Instructional Technology Specialist to support technology use.

Irving ISD was selected as a Microsoft Center of Innovation for their overall use of technology. Technology can be used in a variety of ways in the education community, and schools set their own goals for integrating technology into the curriculum. Irving ISD strives "(t)o provide equitable access to technology for all students, seamlessly infusing technology into teaching and learning, so that every graduating student is empowered with multiple choices for their future."

An example of Irving's innovative use of technology is a laptop computer program in the district's high schools. Last year, as part of a pilot program, laptops were provided to every student at the Academy High School. The Academy used laptops and smaller learning communities within the campus to change the way instruction was provided to high school students. Due to the program's success, Irving ISD is expanding the program to the remaining three high schools where 9th and 10th grades work in teams. The district's Long Range Plan for Technology calls for future expansion of the program to 11th and 12th grades.

Technology in Action: Virtual Voting 2000

One of the first projects to involve all students and teachers in the use of the equipment was "Virtual Voting 2000". During the last presidential election, middle school and high school students from four campuses used videoconferencing to develop the project resources. The middle school students wrote an Access database to register 'voters', record votes, and track the results. The high school students developed an interactive Web page using the middle schools' database so that students from all 30 Irving campuses could register and vote.

Irving ISD on Integrating Technology

Beware of "Too Much, Too Soon"

Irving ISD is successful because it is willing to move quickly to offer technology to the whole district when a pilot program shows it to be valuable. However, moving quickly all the time does cause stress for teachers and administrators. Through its experience in bringing technology into schools, Irving has learned to be careful not to ask teachers to adopt more applications than they are able to absorb at once, while continuing to stretch their capabilities.

About Centers of Innovation

Over 22,000 students registered before the national deadline, and over 18,000 cast their ballots on Election Day. There were debates, brochures, campaigns, and analyses of true campaign issues that grew from the project. After the election, votes were evaluated by students in social studies, math, and government classes. Using Excel and its charting capabilities, district data was compared with election results at the local, state, and national levels. Microsoft Office Products made this an event where students and faculty on all 30 campuses were able to participate

in authentic, project-based learning.

Professional Development With Needs-Driven Teacher Technology Training

Following the recommendations of the district's staff development task force, technology training in Irving is needs-driven and offered in a variety of formats. Last year, teachers were asked to participate in an online survey regarding needs and preferences for staff development. Over 1,500 (71%) teachers took the opportunity to do so. This year, they were asked to take a second assessment regarding their specific technology training needs. Close to 2,000 teachers (86%) responded. As a result, Irving ISD provides training in a variety of ways on application-specific topics, integration of technology into the curriculum, and Internet use. Teachers can find information about staff development opportunities and register for training workshops on the district Web site.

- Online Survey: Irving ISD Professional Development Needs Assessment Online Survey
- Second Assessment Survey
- Training Workshops

Though some of the training is done at district-level sessions, the majority of training takes place on campus. Each campus has a full-time Instructional Technology Specialist (ITS) and a full-time Campus Technician (CT). High schools have two of each. The ITSs provide campus-identified training, work with teachers in groups or singularly to develop projects and lessons that use the technology to address district curriculum, and help teachers research Web sites and software that can help with particular lessons. As new technology becomes available, they help the campus integrate it into instruction. The CTs support all the hardware on the campus and instruct teachers how to use the equipment. Teachers can also participate in "Anytime Anywhere Learning" through the Connected University, UNT Voyager Program, or classes offered on the district Blackboard site.

- District Curriculum
- Connected University
- Voyager University Program
- Irving ISD Blackboard

Current Technology

Use	Microsoft Solution
Infrastructure	• **Windows ® 2000 Server** • **Active Directory ®** • **School Interoperability Framework** • **Zone Integration Server**
Collaboration	• **Exchange 2000** • **SharePoint TM Team Services** • **SharePoint Portal Server** • **Microsoft Outlook ®**
End User Tool Set	• **Office XP** • **Windows XP** • **FrontPage ®** • **Publisher**
Professional Development	• **Microsoft Innovative Teachers Program**

Last updated: April 14, 2004

Case Studies

Primary Case Study Focus: Microsoft Office SharePoint Portal Server 2003

Willamette Education Service District

Willamette Education Service District Chooses Microsoft SharePoint Products and Technologies for Their Enterprise Portal, Predicting 20% Improvements in Service Delivery, 10% Reduced Costs, and Increased Community Support

CASE STUDY
Posted: March 11, 2004

Back to Previous Page

Willamette Education Service District (WESD) is the administrative agent for over 40 state and federal projects across three Oregon counties. WESD needed to improve service delivery, coordinate its operations, and improve communication and teamwork. After evaluating several products from leading vendors, WESD decided to implement a solution based on Microsoft SharePoint Products and Technologies. Over 1000 employees, administrators, teachers, students, and parents will use the portal as a single, secure point of access for all school-related information. This has reduced overlapping programs and services, increased cooperation among departments, and reduced IT support costs. WESD also expects to achieve 20% faster service delivery and similar improvements in the planning, executing, and documenting of district programs—saving money while improving the support of the school system.

Situation

The Willamette Education Service District (WESD) serves as the administrative agent for more than 40 state and federal projects throughout Marion, Polk, and Yamhill counties. Their mission is to help achieve Oregon's educational goals by providing high-quality, cost-effective services to the District's 66,000 K-12 students and their families. WESD realizes economy of scale to provide efficiency and quality of services such as cooperative purchasing, Special Education programs, student testing, and financial administration.

Budget pressures and increasing public expectations of

Solution Overview

Company
Willamette Education Service District

Customer Profile
Willamette Education Service District (WESD) serves as the administrative agent for numerous state and federal projects throughout Marion, Polk, and Yamhill counties. Their mission is to provide high-quality, locally responsive, and cost-effective services to the District's 66,000 K-12 students and their families.

Business Situation
Responding to continuing budget pressures and increasing public expectations of educational quality, WESD needed to improve its delivery of services through better internal communication and teamwork, elimination of duplicated effort, and improved information access to its constituents.

Solution Description
The District deployed a comprehensive portal solution based on Microsoft® Office SharePoint™ Portal Server 2003 and Microsoft Windows® SharePoint™ Services. The WESD Portal will provide enhanced intranet and extranet information access and application integration for District employees, administrators, teachers, students, and parents.

Benefits

- Cycle time to plan, execute, and document District programs reduced 10%
- Service delivery cost reduced 10% by

educational quality put substantial pressure on Oregon's public education resources. To meet public expectations while maintaining fiscal responsibility, WESD needed to improve its service delivery and to access potential external revenue streams.

District leaders realized that all stakeholders in the education system (administrators, staff, teachers, parents, and the broader community) needed to more easily find, process, and share information. Data was distributed throughout line of business applications, enterprise project servers, ad hoc team collaboration sites and shared folders, and individual desktop computers. Information dispersal made it increasingly difficult for all the District's constituents to communicate and collaborate on the issues important to them, whether it be daily work, individual student progress, or broader educational issues and decision making. Managing information access frequently required intense IT support which was driving up the cost to deliver District services. Reversing these trends was a top priority for the District. Looking forward, leaders also wanted to increase community involvement and support of public education, and to open up new revenue sources through web hosting and other offerings to private industry.

eliminating overlapping programs and services

- Service delivery speed increased 20%
- Responsiveness to service issues improved by 20%
- IT support costs reduced 10%

Software and Services

- Microsoft Exchange 2000 Server
- Microsoft Office FrontPage 2003
- Microsoft Office Professional Edition 2003
- Microsoft Office SharePoint Portal Server 2003
- Microsoft SQL Server 2000
- Microsoft Visual Studio .NET 2003
- Microsoft Windows Server 2003 Enterprise Edition
- Microsoft Windows SharePoint Services

Hardware

- Dell 1650 Dual XEON Prestonia
- Dell 2650 Dual XEON Prestonia
- Dell 550 Quad XEON MP

Vertical Industries
Training

Country/Region
United States

Audiences
Business Decision Makers
Information Technology Professionals

Solution

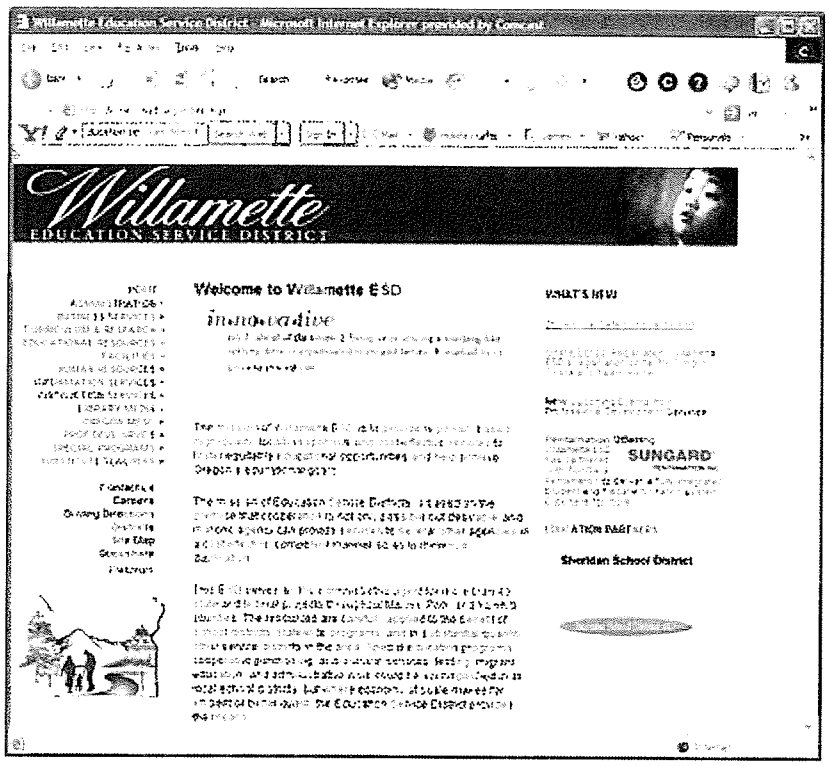
WESD concluded that a portal would provide for the needs of its diverse constituents. After evaluating several products from leading vendors in the portal arena, WESD chose an enterprise portal (the WESD Portal) based on Microsoft® SharePoint™ Products and Technologies, including Microsoft Office SharePoint Portal Server 2003 and Microsoft Windows® SharePoint Services.

Windows SharePoint Services enables WESD information workers to quickly develop collaborative team workspaces or "team sites". Using templates, team sites can be easily tailored to meet specific requirements and are scaleable to meet the needs of virtually any sized team. SharePoint Portal Server 2003 takes advantage of Windows SharePoint Services' Web service architecture to aggregate previously distributed information at WESD, and provides the network architecture for an enterprise-wide portal solution.

Making the Choice

The decision for Microsoft products came after carefully considering the needs of the District's constituents. "We wanted to unite communities within the District with a shared network," says Nick Jwayad, WESD's Manager of Special Projects. "SharePoint Products and Technologies were the natural choice because of strong capabilities in collaboration, information sharing, and flexible team workspaces. When we compared SharePoint Portal Server 2003 with its competitors, we were impressed with its superior functionality, flexibility, and adaptability."

SharePoint Portal Server 2003 also promised to be cost-effective. "Apples-to-apples" comparisons among the leading portal candidates revealed Microsoft offered substantially lower total cost of ownership: beginning with product purchase, proceeding through deployment, customization and integration, and concluding with ongoing support and maintenance. Nick Jwayad explains: "Cost was certainly a factor, and there was a significant advantage to SharePoint. It wasn't just the initial costs—we also had to consider ongoing support, maintenance agreements, consulting, and project management fees." In addition, WESD's IT staff already had SharePoint Portal Server and Windows SharePoint Services development experience, providing a foundation for the future. Jwayad summarizes the business case: "Considering WESD's strengths and limited resources, there were a lot of advantages to Microsoft SharePoint Products and Technologies."



The WESD Portal

Portal Description

The Portal is based on SharePoint Portal Server 2003 and Windows SharePoint Services; Microsoft Windows Server™ 2003 operating system, SQL Server™ 2000, and Exchange 2000 Server; plus other Microsoft technologies including Microsoft Office Professional Edition 2003, FrontPage® 2003 website creation and management tool, and Microsoft Visual Studio® .NET 2003 development system. The Portal's hardware implementation follows a Medium level Portal Farm Topology.

Easy, Fast Deployment

As the WESD technical staff became familiar with the Portal, they quickly learned to use its enhanced communication tools and then began developing their own web parts and experimenting with customized data views, for example to expose student performance data or financial account information.

These successful efforts indicated how easy the Portal will be to deploy and use. Says Shawn Russell, Senior Systems Architect in WESD's IT Division: "We began the Portal roll-out with our technology department for personal sites, shared workspaces, and document sharing. It was a very quick, easy, and intuitive deployment—I was very pleased with that."

Collaboration Tools and Document Management

Windows SharePoint Services enables information workers to create and use flexible team sites and collaborate on projects using comprehensive document management and collaboration tools, all accessible from the familiar Microsoft Office desktop environment. District employees currently use about 100 team sites for collaborating on diverse tasks such as planning

educational events, developing curriculum, and managing budgets. Based on initial experience with the Portal and team sites, collaboration and team efficiency should increase dramatically. Nick Jwayad describes his team's expectations: "As people realize the ease of use and enhancements this brings to their working activities, we expect rapid spread of team sites and the use of shared document libraries beyond the District to individual agencies and schools."

Personalization and Audience Targeting

Information workers are enthusiastic about using My Sites, personal portal pages provided by SharePoint Portal Server 2003 where workers can organize the information, programs, and team sites they access throughout the day. For example, My Sites may be used for individual classroom/teacher sites, student achievement announcements, teachers' educational portfolios and profiles, and links to educational web sites.

Through an extranet, teachers and administrators plan to create and provision parental sites containing curriculum information, course outlines, homework assignments, grades, parent/teacher conferencing schedules, and other information. Parents will be able to pay fees, tuition, and other educational costs on-line while viewing their child's account.

Secure Enterprise Applications Integration

SharePoint Portal Server's Single Sign-on feature will allow secure access to a number of the District's enterprise-level applications. These include Informix database servers, the Oregon Migrant Student Information System (OMSIS), and SunGuard Pentamation, an information processing application for financial, human resource, and student performance analysis. In addition, the WESD Portal will replace the current Xerox DocuShare system, and its body of documents will be accessible by information workers throughout the District. Nick Jwayad summarizes the District's expectations: "The portal is designed to bundle various diverse business applications together, and SharePoint Portal Server 2003 does this very well."

Benefits

The Portal is already delivering tangible business benefits through better information access, team collaboration, and applications integration. The District expects to achieve these performance metrics:

- Cycle time to plan, execute, and document District programs reduced 10%
- Service delivery cost reduced 10% by eliminating overlapping programs and services
- Service delivery speed increased 20%
- Responsiveness to service issues improved by 20%10% reduction in IT support costs

In addition to these quantitative metrics, the District expects the WESD Portal to help improve student performance and enhance the classroom experience by providing new teaching and learning tools and improved information access to parents and the general public. This gives parents the ability to become more involved with the education of their children.

Every WESD Constituent Benefits

WESD staff and IT leaders: For the first time, WESD employees can create and manage team sites without extensive IT staff involvement. This saves more than 10% IT support costs and

improves all aspects of a team's work flow: assigning tasks, making decisions, preparing documents, and presenting results. Using Windows SharePoint Services, information workers can define and provision shared document libraries, participate in on-line discussions and virtual meetings, and produce team documents using modern check-in/check-out and versioning tools directly from familiar Microsoft Office programs.

Shawn Russell describes the Portal's value to the IT professional staff: "SharePoint is more intuitive and open than its competitors—what SharePoint does so well is to enable the worker to work on a team document collaboratively, without extensive IT staff support. We no longer have to 'lead & point' in one-on-one efforts with each user, as in the traditional IT setting." He continues: "This greatly eases the communication and collaboration process, and as a result, people are feeling good about the Portal project."

Teachers and students: District leaders are particularly excited by opportunities the Portal provides to improve web-based teaching tools to enrich students' educational experiences. For the first time, teachers can create and manage their own classroom team sites. Students can create a My Site, complete with document libraries for lecture notes, class schedules, assignments, calendar, and more. In the future, the Portal will provide new ways to submit homework online, create and share multimedia presentations, and communicate with teachers and other students. The projected result: better attendance, improved homework, increased interest in the curriculum and courses, and better overall academic performance.

Parents: Parents will have new ways participate in their children's education using a familiar web-based environment. For example, they will have secure access to academic progress, attendance, grades, and classroom participation. In the future, parents will be able to view and pay student accounts, schedule teacher conferences, and contribute in other ways to their child's educational experience. Modest access fees will help offset the cost of these services.

Community members and private industry: The community at large will access information concerning education programs and facilities in their area, upcoming events, public meetings, school board actions, and other information designed to more fully involve the public in the educational system.

The District further expects to open up new revenue opportunities by offering portal and web hosting services to other educational agencies and organizations in the private sector.

In summary, the WESD Portal provides tangible business value to the operations of the Willamette Educational Services District by breaking down traditional barriers to communication and collaboration. WESD needed to improve their operations in ways that enabled them to become a more efficient, cost-effective service provider. The Portal is meeting that need very well, with bright prospects for the future. Says Nick Jwayad: "SharePoint Products and Technologies have allowed us to further the entrepreneurial direction of the District. Now, we can easily create, manage, and share information, use discussion boards, and take advantage of all those things we need to keep communications going and improve our efficiency. SharePoint Portal Server and Windows SharePoint Services are perfect solutions for us."

For More Information

For more information about Microsoft products and services, call the Microsoft Sales Information Center at (800) 426-9400. In Canada, call the Microsoft Canada Information Centre at (877) 568-2495. Customers who are deaf or hard-of-hearing can reach Microsoft text telephone (TTY/TDD) services at (800) 892-5234 in the United States or (905) 568-9641 in Canada. Outside the 50 United States and Canada, please contact your local Microsoft subsidiary. To access information using the World Wide Web, go to:
http://www.microsoft.com/

For more information about Willamette Educational Services District, visit the Web site at:
http://www.wesd.org/

Press contact: rrt@wagged.com
SharePoint SIG

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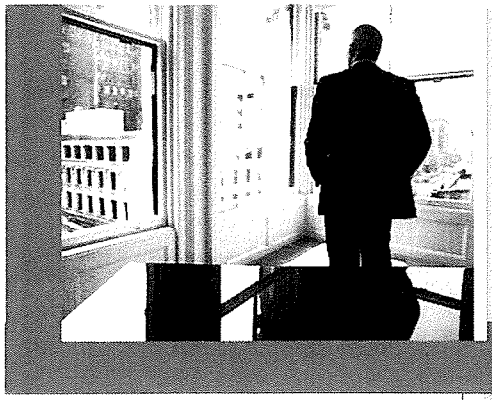


Collaborative Learning Portal Promotes Student Success at Lake Washington School District

"Our new Microsoft Office System-based Learning Portal solution provides us with more access to specific and aggregated data because our systems are now linked. With the learning portal, we offer targeted information for teachers, parents, and administrators and provide resources that meet individual students' educational needs."

Chip Kimball
Assistant Superintendent
Lake Washington School District

Lake Washington School District

The Lake Washington School District engaged HP Services to develop an online Learning Portal that combined collaborative elements of the Microsoft Office System, Microsoft enterprise servers, and customized Microsoft .NET-enabled Web services, which integrate new and existing IT components. Converting the district's current data management system into a decentralized, self-service information delivery system will help district educators achieve their goal of ensuring that all students pass state-mandated performance exams by 2008. The solution will also help district educators:

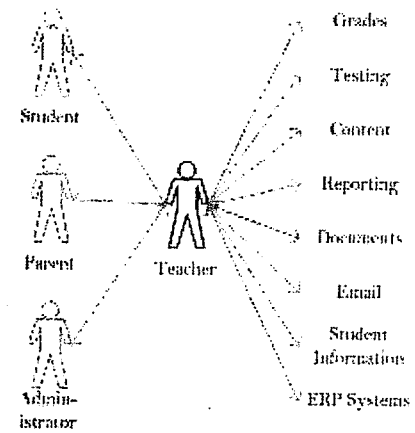
- Reduce up to 1.5 hours a day (56 percent) of non-teaching time that teachers currently spend in routine administrative tasks and locating resources and help them reallocate this time to lesson planning and individual instruction.
- Reduce by 67 percent the time needed to compile, analyze, and communicate student grades, test results, and progress reports.

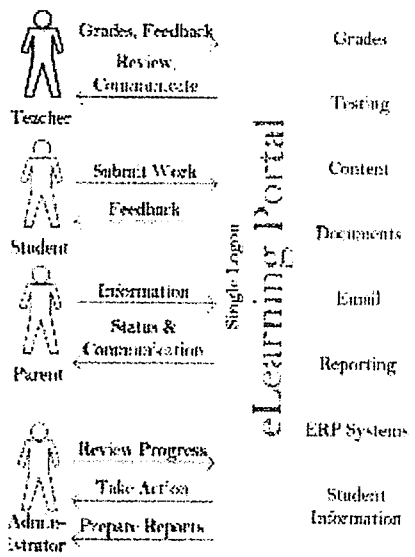
CUSTOMER PROFILE	BUSINESS SITUATION	SOLUTION	BENEFITS
With 48 schools and nearly 23,500 students, the Lake Washington School District (LWSD) based in Redmond, Washington uses its "forward to the new basics" approach to education, which reflects the district's willingness to adopt innovative approaches to teaching. the district's curriculum has been praised in national education publications for a comprehensive approach to student-centered learning.	Many administrative tasks and a cumbersome data management system prevented LWSD teachers from devoting more one-on-one instruction time to struggling students. District educators wanted a data management system that could eliminate many of these tasks and help administrators reallocate resources to at-risk students quickly and easily.	HP Services developed an online Learning Portal solution that uses the tight integration of Microsoft enterprise server products, Microsoft® .NET-enabled Web services, and the collaboration components of the Microsoft Office System to transform the district's disparate information resources into an integrated data management and messaging platform.	▪ Identifies under-achieving students more quickly ▪ Enables parents, teachers, and administrators to communicate quickly and easily ▪ Gets closer to achieving the goal of a 100-percent matriculation rate for the state standardized tests by 2008 ▪ Increases student performance of all students by reallocating time and resources

Microsoft Office

"With HP as a partner, we have an opportunity to realize the full potential of our many years of technology investments."

Chip Kimball
Assistant Superintendent
Lake Washington School District





Situation

At the Lake Washington School District (LWSD) in Redmond, Washington, the primary mission is to create a better education system, one that helps all district students succeed.

Student success at LWSD means academic achievement leading to graduation. The State of Washington plans to make passing yearly performance tests a requirement for public school graduation. The district's goal is to ensure that 100 percent of LWSD students are qualified to graduate by 2008.

Currently, more than 90 percent of LWSD students graduate. But in 2002, the district adopted new graduation standards that require demonstrated competency. Throughout Washington state, all students will be required to pass state tests for graduation. District teachers and administrators know that helping all of their students succeed requires a resource that is currently in short supply at LWSD—more teaching time.

Allocating more time to teaching students who need it is hampered by a cumbersome data management system and an IT infrastructure consisting of disparate databases that don't integrate well. In many cases, the information required for academic achievement is still maintained entirely on paper

Dr. Chip Kimball, the district's assistant superintendent and chief technology officer, explains saying, "Although LWSD had already standardized on Microsoft® technologies, the Microsoft Office system provides the capabilities the district needs to capitalize on its previous IT investments and to create new systems that would continue to help the district operate more efficiently."

More time for individual student attention. Each workday, LWSD teachers spend about one-third of their time engaged in administrative and planning tasks that require them to generate student reports, notify parents and colleagues, and other administrative tasks. These teacher-centered tasks create a heavy administrative workload, which prevents LWSD educators from providing extra individual attention to students who fall behind.

Up-to-date student progress reporting. Disconnected data management systems and processes make identifying students who might need additional attention a difficult task. The lack of real-time data systems focused on student information often makes it necessary for teachers to spend enormous time and energy compiling and analyzing relevant test results and grade information and communicating student progress to parents and administrators. Standardized test scores often take months to arrive at district schools. These delays make it difficult for LWSD educators to anticipate problems and assign students additional resources before problems become deep-seated or students move on to the next grade.

Dr. Kimball engaged HP Services, a division of Hewlett-Packard, to develop a solution that would help district teachers spend more time teaching struggling students and help administrators allocate resources quickly and accurately

Solution

LWSD engaged HP Services to develop an online Learning Portal. This solution used the tight integration between collaboration components of the Microsoft® Office System, enterprise server products that are part of the Microsoft Windows Server System™, and Microsoft .NET- enabled

Microsoft Office

Web services to transform the district's infrastructure into an integrated data.

Benefits

The Learning Portal will help LWSD educators spend more time teaching at-risk students by spending less time in three types of administrative tasks.

Removing the paperwork bottleneck. Currently, teachers engage in many types of student-related paperwork by grading, filling out, or handing off permission slips, tests, homework, and status reports. By providing 24-hour access to information from any district Internet-ready computer, the new online Learning Portal enables teachers to submit student-related information and encourages parents, students, and administrators to help themselves to education-related information and services. For example, the new portal solution enables:

- Students to download and submit homework online.
- Parents to request permission slips and have them sent to them automatically as an e-mail message.
- Administrators to search for student grades, test results, and progress reports.

LWSD expects that by avoiding the distractions of routine paper handoff and notification tasks, district teachers will gain 56 percent more time (up to 1.5 hours a day) to plan and deliver individualized attention to at-risk students.

Faster delivery of student progress data. Currently, LWSD teachers track student progress by referring to and analyzing homework grades, test scores, general progress notes, and standardized test results stored in district administrative systems.

To get access to information about individual students, users go to the LWSD intranet site and use the appropriate interface. For example, teachers can search for student-specific data, standardized test scores, and other information that indicates student progress. Parents can view student grades and test results that teachers have published on the site.

Easy access to a district-wide repository of state and local test results and student information will provide district educators with feedback in 67 percent less time and forward relevant information to parents 64 percent more quickly. These improved data access and communications capabilities will help LWSD educators to identify at-risk students more quickly and provide individualized online and face-to-face instruction before they need to make pass-fail decisions.

Accelerated collaborative document development. LWSD teachers also participate in ongoing committees that create school improvement plans, student growth plans, and other important administrative documents. Committee members develop these documents by writing, reviewing, and commenting on files they send through the district e-mail system. This approach results in serious version control problems, the occasional lost document, as well as rework, frustration, and delays. The document version control and archiving capabilities of the new Learning Portal will enable only one committee member at a time to find the relevant document, check out the latest version, work on it, and check it in again. LWSD expects that using the collaboration capabilities of the new solution should significantly reduce the time and effort teachers spend on collaborative documents

Software and Services

Microsoft® Office System
- Microsoft Office Outlook® 2003
- Microsoft Office SharePoint™ Portal Server 2003

Microsoft Windows Server™ Family
- Windows® Server 2003

Microsoft Visual Basic® .NET

Partner
- HP Services

How Benefits Were Measured

Navigant Consulting, Inc., an independent consulting organization, performed a cost and benefit analysis to determine business and financial metrics associated with the investment in the Microsoft Office System solution.

Using established cash flow analysis, standard financial data was measured, including: *payback*, the time it takes a company to recoup its investment in the solution, *net present value (NPV)*, the total value to the customer from investing in the solution, expressed in today's dollars, *NPV per user*, the NPV divided by the number of users affected by the solution; and *internal rate of return*, the rate of return that the customer expects from investing in the solution.

While every organization has unique considerations for economic analysis, this case study highlights key areas where potential economic value from the Microsoft Office System can be realized. Navigant Consulting's Value Impact Analysis (VIA) practice strongly recommends that all significant IT investments undergo a rigorous economic justification to comprehensively identify the full business impact of those investments.

Microsoft Office

Microsoft Office is the business world's chosen environment for information work that provides the software, servers, and services that help you succeed by transforming information into impact.

For more information about Microsoft Office System, go to: http://www.microsoft.com/office

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For more information about the Lake Washington School District, visit the Web site at: http://www.lkwash.wednet.edu

For more information about HP Services, visit the Web site at http://www.hp.com

For information about HP Services for education visit http://government.hp.com/k12/hpeducation/index.html

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Date Published: October 2003

Microsoft Office

Microsoft® Office System
Customer Solution Case Study

California School District Improves Collaboration and Streamlines Information Gathering

> As a school district, we need to turn more and more to technology to improve the quality of the educational experience and the efficiency of our operations. We can't teach kids to live in a technical world and still be doing things on paper. We've taken small steps in using technology until now, but the Microsoft Office System is going to help us to take some big leaps
>
> Stan Trevena, Director of Information and Technology Services, Modesto City Schools District

The Modesto City Schools District, a K-12 district in northern California, needs to improve district wide collaboration among administrators and teachers while reducing face-to-face meetings. It also needs to reduce the time and cost of gathering, processing, and distributing information, while relieving the IT staff of the burden of responding to requests for routine information such as documentation and system maintenance and event announcements. By deploying the Microsoft Office System, along with Windows Server 2003 Enterprise Edition and Windows SharePoint Services, the school district expects to achieve those goals while improving productivity, lowering the cost of collaborative projects, and ensuring that administrative employees have access to the most up-to-date information.

Overview

Country: United States of America
Industry: Education

Customer Profile

The Modesto City School District in northern California includes 23 elementary schools, four junior high and middle schools, five comprehensive high schools, and one alternative education center. Approximately 3,380 employees serve more than 34,000 students.

Business Situation

Faced with decreasing budgets and increasing demands, the district wanted to continue district wide collaboration on administrative and education projects while reducing face-to-face meetings. It also wanted to provide workers with direct access to critical information and automated information gathering.

Solution

Modesto City Schools deployed the Microsoft® Office System and Microsoft Windows ServerTM 2003 with Microsoft Windows® SharePointTM Services to create easy-to-use portals to enable district workers to collaborate effectively without face-to face meetings and to automate information gathering.

Benefits

- Reduced meeting time
- Shorter learning curve
- Reduced cost of forms
- Reduced IT support requirements

Squaretree IT Projects

Microsoft Office

"You can open up a SharePoint site within a task pane in Word, and then start collaborating on a document.... The similarity of the SharePoint interface to the rest of the Microsoft Office System makes it a lot easier for our users to navigate and process information."

Harold Rhodes, Supervisor of Computer Systems, Modesto City Schools District

Situation

The Modesto City Schools District in California includes 33 schools and three administrative sites, all connected through a wide area network. As of 2003, the district had more than 3,380 employees serving more than 34,000 students. Those numbers continue to grow while the district faces tighter and tighter budgets.

District-wide collaboration on technology projects, critical administrative applications, and personnel issues require numerous face-to-face meetings, which force teachers and administrative staff to take time away from students, reducing productivity and incurring mileage costs. The district also processes hundreds of different types of forms every year, which are costly and time-consuming to print and distribute, and difficult to manage. District planners began to look for an affordable solution to address those challenges and thus improve information gathering and sharing while reducing costs.

In 2002, the school district revised its technology plan to encourage administrative personnel and teachers throughout the district to start integrating technology into their daily activities. In doing so, the district hoped to improve its ability to collaborate, increase its efficiency, and reduce costs.

Developing the new technology plan called the district's attention to the need for more efficient collaborative tools. Initially, the district formed a Technology Council of about 30 school district employees, including teachers, administrators, librarians, and information technology (IT) staff to discuss technology issues and assign priorities for large projects. To address issues between meetings, the council exchanged e-mail through newsgroup lists but found that approach to be too narrow and lacking in advanced collaborative features.

At the same time, a group of more than 100 users of the district's mission-critical SASI student administration application met once a month to exchange ideas and address challenges. The SASI user group had grown so large that it had to divide into four subgroups. Because its members are responsible for key administrative functions at their schools, a significant percentage often couldn't attend meetings.

In addition, Modesto City Schools needed to reduce the large volume of calls to the IT department for routine documents such as meeting notices and user guides. The volume of those calls was hindering the IT staff's ability to enhance existing systems and resolve more complex support problems efficiently.

Finally, Modesto City Schools needed a more efficient way for users to access and complete forms such as personnel evaluation forms, pay claims, transfer forms, and equipment order forms.

The district needs a solution that supports collaboration, provides a central access point for information and forms, and is easy to use. It is also important that the solution help reduce meeting and administrative costs and increase productivity.

Solution

In March 2003, Modesto City Schools began to deploy the Microsoft® Office System, including Microsoft Office Professional Edition 2003, the Office InfoPath™ 2003 information-gathering program, and Office SharePoint™ Portal Server 2003. For the server foundation, the district chose Microsoft Windows Server™ 2003 and Windows® SharePoint Services 2.0, part of the Microsoft Windows Server System™ integrated server software. This deployment would enable the district to create a central information portal for all documents and

"We discovered that we could easily transition existing Word-based forms into InfoPath-based forms simply by cutting and pasting or clicking and dragging the text.... Once people see how easy it is, not only to develop the forms with InfoPath, but also to manage them, they can't wait to use it."

Harold Rhodes, Supervisor of Computer Systems, Modesto City Schools District

forms and thereby automate information gathering and dissemination.

The district started by testing the portal solution with three critical groups—SASI users, the Technology Council, and the IT department. The deployment team, which included Microsoft Consulting Services, the IT staff at Modesto City Schools, and SquareTree Software—a local Microsoft Certified Partner—designed and built information portals for each of the three pilot groups on SharePoint Portal Server running on the Windows Server 2003 Enterprise Edition operating system.

The 90-day proof of concept, with about 125 people from the three groups, showed that users were able to collaborate as effectively through virtual interaction as through face-to-face meetings. In addition, supplying direct access to needed information reduced calls to the IT support group. Next, the school district began to evaluate using Microsoft Office InfoPath to replace its paper-based and Microsoft Office Word–based forms, starting with those most frequently used by the Personnel and IT departments.

"As we got more familiar with InfoPath, we discovered that we could easily transition existing Word-based forms into InfoPath-based forms simply by cutting and pasting or clicking and dragging the text," says Harold Rhodes, Supervisor of Computer Systems for Modesto City Schools. "Those forms are then stored on a SharePoint site and accessed through the portal."

After a two-hour training session on the Microsoft Outlook® messaging and collaboration client and InfoPath, the district deployed Office Professional Edition 2003 through an administrative installation point that automatically pushed the software to each user's computer through the Windows Active Directory® service. By September 2003, the district had installed the Microsoft Office System on approximately 200 desktop computers. About half of those run the Windows XP operating system and the remainder runs Windows 2000 Professional. The district had also created approximately 30 Windows SharePoint Services sites, which serve about 300 users. These sites are connected through a central portal using SharePoint Portal Server 2003.

In a parallel project, Modesto City Schools is converting its entire district intranet, accessed by teachers and administrators, to SharePoint Portal Server. The new intranet will provide a central repository for all district information, including forms, documents, policies, regulations, and bylaws, and will offer full indexing and search capabilities.

Benefits

Deploying the Microsoft Office System has enabled the Modesto City Schools District to start moving some of its documents into a single portal that users can access directly and where they can collaborate on documents in real time. This reduces document requests and enables the IT department staff to maintain a high level of collaboration and resolve issues more quickly, while eliminating a significant amount of travel and face-to-face meeting time for the district's user groups. In addition, InfoPath will enable the district to automate information gathering, which reduces the paperwork burden on both the administrative and teaching staff and reduces the cost of printing and distributing forms.

Collaborative Features Reduce Meetings

By deploying the Microsoft Office System and SharePoint Products and Technologies to the three pilot groups, Modesto City Schools was able to reduce the time, effort, and money required for face-to-face meetings of these pilot groups. In its preliminary test, the district found that new Office collaboration

functionality (such as Document and Meeting Workspaces, instant messaging, and live e-mail attachments), as well as productivity tools (including shared calendars and contacts, Outlook Search Folders, and new document libraries) made virtual collaboration as effective as physical presence, if not more so.

As a result, the SASI user group was able to eliminate its monthly meetings. "By using these virtual workspaces, we continue the conversation without the monthly meetings," says Stan Trevena, Director of Information and Technology Services for Modesto City Schools. "This allows our user groups to communicate in real time instead of trying to address all issues together at a monthly meeting. We're adding another 200 users to the SASI user's group with this new system, because the user group participants don't have to take the time out of the office for travel and meetings. In these tight budget times, that's a big benefit."
The school district expects that the collaboration capabilities and availability of information resulting from the deployment of the Microsoft Office System will increase participation in districtwide projects because both teachers and administrative staff will be able to contribute ideas when they have the time rather than according to a rigid meeting schedule.

Familiar Interface Reduces the Learning Curve

Because 90 percent of the school district's users are familiar with Microsoft Office programs, little training is required on the new collaboration features. "You can open up a SharePoint site within a task pane in Word, and then start collaborating on a document," Rhodes says. "Or instead of attaching a file, you can send it to the shared area on the SharePoint site. The similarity of the SharePoint interface to the rest of the Microsoft Office System makes it a lot easier for our users to navigate and process information."

Rhodes also notes that the indexing and search capabilities in SharePoint Portal Server make it much easier for users to find what they're looking for. Because the previous intranet solution had very little search capability, people typically sent a URL in e-mail. "With SharePoint Portal Server, users will be able to type in a keyword and go right to the form or document that they're looking for, rather than call someone and request a copy," Rhodes says. "This saves time and requires less support on the other end."

The users' familiarity with the interface and functionality throughout the Microsoft Office System has also made it much easier for the deployment team to gain enthusiasm among the administrative staff and teachers for the new software. "Often when we say, 'I have this really cool new program to teach you,' the walls go up," Trevena says. "But when we showed users a SharePoint site, they immediately recognized it as a Web page. They weren't intimidated. They jumped right in and started using the search function and clicking on the links."

Automated Information Gathering Reduces the Cost of Forms

Using InfoPath to gather and route information is expected to eliminate many of the manual forms that the district now uses. "The Personnel department processes 60 to 70 percent of our forms, and right now they have an entire wall with more than 200 forms to choose from," Trevena says. "SharePoint Portal Server and InfoPath will replace that wall with a central repository of electronic forms. This will save users time in locating the correct forms and save administrative time and printing costs."

InfoPath includes several features that provide the flexibility of paper forms while expediting processing. For example, InfoPath supports multiple views of a single form so that form designers can define different print views for different types of users, while retaining the master form intact. The district also plans to implement the digital signatures capability for certain documents so that routing and approval can be handled entirely online.

What's more, reporting features of SharePoint Portal Server can verify that users have opened a document. This enables the district to verify that the staff has received and accessed important documents without having to print out hundreds of hard copies.

Portals and Electronic Forms Reduce the IT Support Burden

By giving users direct access to the information and forms that they need through an easily searchable portal, the Microsoft Office System portal solution will help reduce the burden on the school district's technical support personnel. Rather than spend much of their time responding to requests for user guides and other documentation, the support staff can work on enhancing systems.

"We only have two people here who are certified SASI support people," Rhodes says. "Because this portal solution will relieve them of having to fulfill the daily requests for documents, they'll have more time to focus on supporting the actual SASI program."

The collaboration capabilities in the Microsoft Office System also increase the efficiency of the district's IT department, which is spread out over three locations. "With the collaboration tools in the Microsoft Office System, including instant messaging, it's not a big issue that we're geographically split because we are in continuous collaboration," Trevena says. "The collaboration tools remove the time and distance dependencies."

In addition, being able to easily transition existing electronic documents into InfoPath-based forms will mean that each department throughout the district can create most of its own forms rather than rely on the IT department to create them. "Once people see how easy it is, not only to develop the forms with InfoPath but also to manage them, they can't wait to use it," Rhodes says.

The Modesto City Schools District expects to rely more and more on technology to build strong district wide participation and consensus on projects and enhance information gathering and sharing, while living within budgetary limitations.

The success of the pilot projects has spurred interest in other projects within the district that will rely on the Microsoft Office System. The district just received the server cluster that will house the core Microsoft Office System components. During the 2003/2004 school year, the district will continue to implement many of the planned projects, such as automated forms, online board policies, and many more shared collaboration sites for specific user and teacher groups.

"As a school district, we need to turn more and more to technology to improve the quality of the educational experience and the efficiency of our operations," Trevena says. "We can't teach kids to live in a technical world and still be doing things on paper. We've taken small steps in using technology until now, but the Microsoft Office System is going to help us to take some big leaps."

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Microsoft Office System

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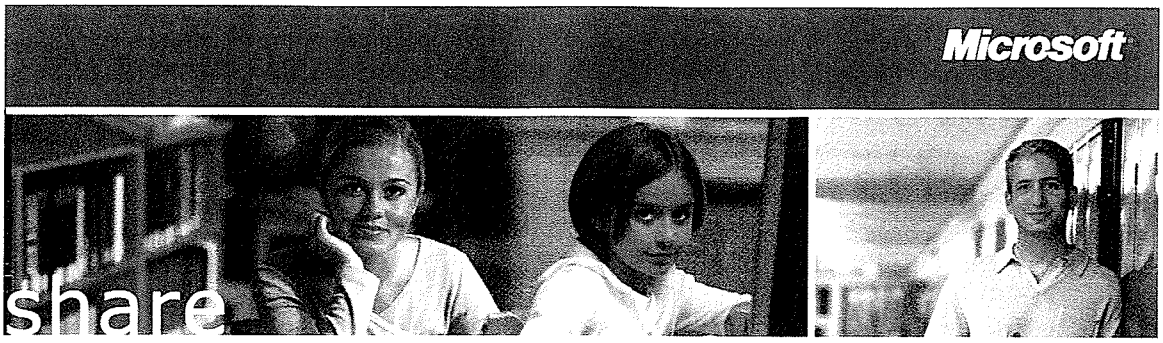


Jump-start Your Interoperability Initiative with a Super Pilot!

Initiate your interoperability project and quickly achieve your goals with a Super Pilot. An Interoperability Super Pilot is a one to three weeks consulting engagement that enables you to jump-start your initiative while containing your costs. Participating in a Super Pilot with a Microsoft partner consultant enables you to quickly and cost-effectively lay the foundation for your interoperability project, and positions you to easily scale the solution across the institution. A Super Pilot will help you:

- Jump-start your interoperability project
- Establish a prioritized interoperability roadmap
- Avoid costly mistakes in solution setup and configuration
- Ensure timely project success

What is an Interoperability Solution?

The Interoperability Solution is an architecture and technology solution that enables dynamic data sharing between district and school applications. With an Interoperability solution, your district can improve reporting processes, leading to:

- Increased efficiency
- Reduced costs
- Maximized funding

The Interoperability Solution leverages a standards-based architecture built on the Schools Interoperability Framework (SIF) specification. This open standard approach enables your district to integrate school and district applications with off-the-shelf components, irrespective of vendor or platform, saving you valuable time and money in a budget constrained environment.

An interoperability solution also ensures that your district can leverage and maximize the use of existing investments in IT platforms and applications for your growing information needs.

The following scenarios illustrate some examples of how districts can benefit from an Interoperability Solution.

Scenario 1: Reducing Redundant Data Entry

Suzie Smith is a new student in Contoso School District. Suzie is enrolled in the

Student Information System. Through the Interoperability Solution, Suzie's personal information is automatically populated in the Transportation, Cafeteria, Curriculum Management Systems, etc. Any change made to Suzie's information thereafter is automatically reflected in all applications. In summary, through this solution, data synchronization of applications is automated. Redundant data entry is eliminated.

Teacher Martinez has just joined the district. Mr. Martinez's desktop login and applications' access is automatically created through Active Directory integration agents at the time his information is entered into the Human Resources application. Mr. Martinez can access all his desktop resources immediately without having to wait for a Network Administrator to set him up. John, the Network Administrator, is relieved from the tedium of maintaining Active Directory. John's time is now spent refining and streamlining Contoso's Network Architecture.

Scenario 2: More Accurate Reporting and Funding

Since data is automatically synchronized amongst critical district applications, all applications reflect the most current status of any student. Consequently, reports generated from any application(s) are always up-to-date. This capability further ensures the accuracy of state and federal reporting and funding.

Scenario 3: One Stop Shop for District Information and NCLB data

Automated data synchronization (data sharing) also facilitates the horizontal collation of data from one or more applications. This is accomplished by populating a standards-based (SIF) data repository that has already has over 600 commonly used fields built into it. The data repository becomes a place where administrators, teachers and parents can access relevant information. Users can access pertinent data without needing to unnecessarily load the district's operational systems. This is also the one-stop location for serving out information to the district portal.

This data repository serves as the centralized data store for the following:

- NCLB Data
- Accountability and Assessment Information
- State Reporting
- Annual Yearly Progress (AYP) Information
- District Data Warehouse (The data warehouse provides aggregated data; the data repository does not aggregate data but provides collated data)

The data repository information is always accurate and up-to-date because it is automatically updated in near-time. Administrators do not have to perform extracts and data imports, which can often be a source of data misalignment.

The following marks the key differences between a data warehouse and a data repository. An administrator might have the following question, *"Give me the percentages of students broken down by ethnicity, who are Title 1 and Special Education?"*

This data request typically involves data to be collated and aggregated from more than one application. Without the K-12 Interoperability Solution, the following three steps are performed to provide the answer:

- Collect data (i.e. Ethnicity, Class, Title1, Special Education, etc.) from applications
- Collate data
- Aggregate data

With the K-12 Interoperability Solution, the three steps are accomplished automatically as follows:

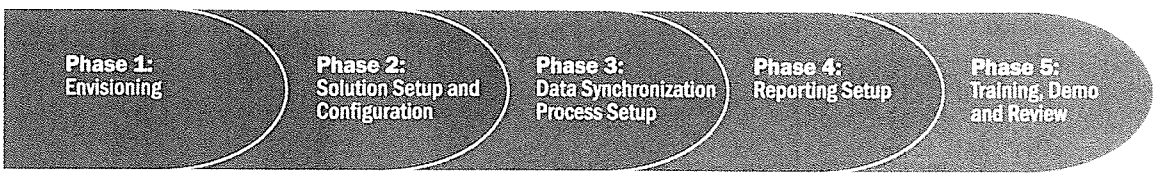
- Automatically collect data from applications – Automated data synchronization into Data Repository
- Automatically collate data – Automatically made available through the Data Repository
- Automatically aggregate data – Automatically summarized data in the Data Warehouse; data is aggregated from collated information available in the data repository

In summary, the data repository is the central point of key student data. The central data repository provides point in time data about a student. The data warehouse provides on-demand summarized information for decision analysis. The data warehouse is constructed at a much lower cost if it can get the data it needs from the data repository. Administrators do not have to spend time, effort and cost collecting and "cleaning" data from multiple disparate applications.

These scenarios are not all encompassing, but you might have experienced some of them and others. The Super Pilot will help you address these scenarios and more, and come up with a prioritized roadmap for addressing them.

How does a Super Pilot work?

During a Super Pilot, you work with a consultant who ensures optimum planning, setup and training. At least one IT staff member shadows the consultant throughout the engagement, ensuring you have a trained staff who can handle ongoing support of the delivered solution. The Super Pilots are divided into the following five phases:[1]



The following is what a 2 week engagement would look like[1]:

Phase 1 (Days 1-3): Envisioning The first phase involves a war-room setting with key staff from your district. During this phase, your consultant helps you develop an Interoperability Solution Document with the following elements:

- Solution Vision

[1] This information constitutes guidelines for a 2-week consulting engagement. The final implementation and project plan is determined and agreed upon between the district and the consultant.

- Solution Benefit Quantification
- Documentation of Current District Applications and Architecture
- Integrated Solutions Architecture and Roadmap
- Prioritized List of Deliverables for the Super Pilot
- Prioritized List of Deliverables for the Next Phase of Deployment

Phase 2 (Days 3-4): Solution Setup and Configuration[2] Phase 2 involves the following steps:

- Configure the Zone Integration Server, the messaging hub for guaranteed delivery/synchronization of data between district applications
- Set up available application agents.[3] Application agents are the interface between the messaging hub and the applications
- Configure Custom Agent Builder to build custom agent for applications that do not have vendor application agents. Custom agents format data to the SIF data format
- Set up Data Repository for horizontal data collation
- Set up agent for Data Repository

Phase 3 (Days 5-7): Data Synchronization Process Setup During Phase 3, your consultant focuses on a set of key data elements that needs to be shared between applications. These key data elements are pre-determined and agreed upon during Phase 1. This phase involves the following steps:

- Set up end-to-end processes so your district can see that data entered in one system is automatically synchronized with one or two other agreed upon applications

- Set up custom data objects for data synchronization, if required data elements are not already covered by the SIF Specifications

Phase 4 (Days 8-9): Reporting Setup During this phase, your consultant builds the set of priority reports agreed upon during Phase 1. This phase involves the following steps:

- Build reports
- Set up user access and permissions to reports

Phase 5 (Days 10): Training, Demo and Review After planning and setup, your IT staff is trained on the workings of the solution. On the last day of the engagement, your trained IT members demo the solution for relevant staff. The consultant delivers the district a prescriptive analysis on follow-up steps that your

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[2] Before the commencement of the Super Pilot, hardware should be purchased if required, and configured according to prescribed hardware specifications, and server software should be preloaded. These requirements can be discussed with your customer engagement manager, and are listed towards the end of this document.

[3] Application agents enable a district to have near-time synchronization capability. The lack of an application agent does not preclude a district from building out an interoperability solution. Without application agents, data synchronization is achieved through application polling at prescribed intervals.

district might consider, taking into account your district's key information priorities.

As a last step, you work with your consultant on a final review. This gives both parties an opportunity to evaluate the success of the Super Pilot and outline potential ongoing opportunities and issues.

What is the Minimum Hardware and Software Configuration?
Before participating in an Interoperability Super Pilot, your district must meet the following hardware and software requirements:

- Minimum Hardware Configuration

- 1 No. Messaging Hub Server
  - At least 1GB RAM
  - At least 2 x 30 GB Disk Space
- 1 No. Data Repository Server
  - At least 1GB RAM
  - At least 2 x 30 GB Disk Space

- Minimum Software Configuration

- 1 No. BizTalk Server 2002, Enterprise Edition
- 1 No. SQL Server 2002, Enterprise Edition
- 1 No. Zone Integration Server (available at no cost to a district; districts only pay a nominal fee for support and maintenance)
- SIF Application Agents, if available. Custom Agent Builder Kit if SIF Applications are not available

Get started on your interoperability project *and* get a special price!

Get started on your interoperability project and improve reporting, increase efficiency, reduce costs and maximize funding. The Interoperability Super Pilot allows you to cost-effectively jump-start your interoperability project. During the Super Pilot, you work through any problems and handle every aspect necessary to deploy your project. Upon completion of the Super Pilot, you can move forward to easily scale the solution across the district. To learn more about taking advantage of a Super Pilot to jump-start your interoperability project, contact your local Microsoft Account Manager. And if your district acts before June 30, 2003 you can deploy the Super Pilot at a fixed engagement cost!

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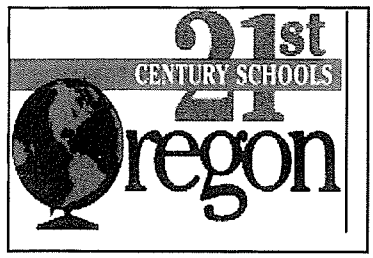

Web-based Solution Enables Better Decision-making, Productivity for the Oregon Department of Education

Published: February 18, 2002

When Oregon passed legislation calling for the creation of a statewide, publicly available database of school financial data, the state's Department of Education turned to KMPG Consulting for a comprehensive, turnkey solution. That solution is WebSTER (Web-based State Education Resource), based on a full range of Microsoft® technologies. The solution enables better decision-making by education officials and legislators; allows the education department to refocus 20% of its education finance staff to other analytic activities; provides more comprehensive data in half the time of the manual system it replaced; and positions the state education department to meet new needs, including federal reporting requirements.

Challenge

In 1990, voters in the state of Oregon passed Ballot Measure 5, a citizen's initiative limiting property taxes and requiring the state to take responsibility for K-12 funding. Prior to Measure 5, Oregon relied heavily on local property taxes to fund schools – 70% of general operating funds came from the property tax.

Now about 70% of school funding comes from the state, and the legislature is primarily responsible for school-funding decisions. With state policy makers increasingly responsible for educational decision-making and with the public call for accountability in school spending, the legislature passed HB 3636 during the 1997 Legislative Session. The bill directed the Department of Education to update the K-12 school budget and accounting system to produce comparable spending information for both schools and districts. Data gathered from the system was to be placed in a database accessible to the public.

To meet these requirements, the Department of Education needed to completely replace – and greatly expand – an outmoded, manual reporting system that brought paper copies of district-level data from the state's 198 school districts, requiring up to 18 months to input and

KPMG Consulting

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Solution Overview

Microsoft Global Partner
KPMG Consulting

Industry
Education

Customer Profile
Oregon Department of Education, a state agency coordinating with 198 school districts throughout the state of Oregon.

Challenge
The Department of Education needed a solution to meet legislated requirements for a statewide database system to collect financial data from schools and districts statewide, and make the information available to the public.

Solution
KPMG Consulting designed a Database Initiative solution based on its WebSTER (Web-based State Education Resource) product. The solution allows districts to provide data within a range of formats, checks the data and deposits it in a Microsoft SQL Server database, and makes it available via standard Web reports. It also enables queries via Microsoft Excel and Access.

Microsoft Software
- BizTalk™ Server 2000
- Windows NT® Server
- SQL Server™
- Microsoft Access and Excel
- Visual Basic®

Benefits
The solution:
- Enables better decision-making by state officials
- allows the education department to refocus 20% of its education finance staff
- provides more comprehensive data in half the time of the manual system it replaced
- positions the state education department to meet new needs, including federal reporting requirements

tabulate, according to Nancy Heiligman, Associate Superintendent, Office of School Finance at the Department of Education.

"The data we now have available for the first time is directly driving better decision-making."

Nancy Heiligman
Associate Superintendent,
Office of School Finance,
Department of Education

Solution

KPMG Consulting and WebSTER

To solve this challenge and implement what it dubbed the Database Initiative (DBI), the Department of Education turned to Microsoft technology and to the solution providers at KPMG Consulting. Their solution for the DBI is the Web-based State Education Resource (WebSTER), which relies heavily on the use of Microsoft Web-based technology and off-the-shelf software to yield shorter development times, easier maintenance, and reduced project risk. The project included a range of Microsoft technologies, including Microsoft Active Server Pages, COM, Internet Information Server (IIS), Visual Basic®, VB-Script, Windows NT® Server 4.0 and SQL Server™ 7.0. The state plans to upgrade the solution to Windows® 2000 Server and SQL Server 2000 for even tighter integration and enhanced use of Internet technologies.

WebSTER as implemented for the DBI has four key components to support education data collection, data reporting and analysis, and policy- and decision-making:

- Data collection, validation and loading
- Data repository
- Status tracking
- Web reporting and online analytical processing (OLAP)

A flexible range of inputs

The solution allows districts to submit their data securely over the Web, using any of a variety of formats–pre-defined standard ASCII, XML or SIF (School Interoperability Framework) file layouts–to accommodate the different systems and rates of technology implementation across the state. For the primary DBI solution, districts need no other client software than a standard Internet Explorer Web browser; for the special education census, KPMG Consulting created a custom COM control which the Department distributes to the districts. The data layouts are normally extracted directly from a district's student information system, management information systems, or via online Web survey forms, filled out much like a paper form.

Tracking and validating the data

Districts send the information to the DBI Web server, an IIS server with a validation and tracking component written in Visual Basic. That component allows users to analyze errors prior to detailed data validation, to receive e-mail notification of data validation errors, and to review errors by type or individual record. Additionally, it allows submitters, as well as Department of Education staff, to monitor the data loading by submitter, type of data, and due dates.

SQL Server-based database serves as data repository

At the heart of the DBI is a SQL Server-based relational database to support the DBI's large-scale data collection, reporting, and analysis requirements. The data repository consists of

several databases to support various incremental loading, validation, reporting and analysis requirements. Once the data has been successfully loaded, it is then available in several formats for internal (secure access) and external (public access) analysis and reporting.

"Instead of tabulating data, our staff can better analyze it. As a result, we're much more productive."

Nancy Heiligman
Associate Superintendent,
Office of School Finance,
Department of Education

Web reports and OLAP

More than 30 Web reports are publicly available to anyone wishing to access and analyze data on students, staffing, school processes, spending, revenues, budgets and school infrastructure. For each report, visitors to the Web site can use various criteria to select and sort the data to create thousands of different reports. Or, if they wish to analyze or reformat the data, they can download it to their own desktop computers.

DBI's Online Analytical Processing (OLAP) capability also gives internal state analysts access to the large data sets to perform more detailed and sophisticated analysis. Users can take advantage of Microsoft Excel, Microsoft Access, or any standard OLAP-compatible tool to construct ad hoc queries of multidimensional views of their data in either tabular or graphic formats. They can conduct drill-down, drill-across or drill-through functions to support detailed analysis.

The project was launched with a pilot of 16 school districts in December, 1997 and expanded in September 1999 to support the statewide implementation. The solution currently holds 900 MB of data, with 600,000 rows with 78 MB of data in the largest support table. The financial OLAP table has 752,000 rows and is 220 MB in size. Each year the school districts send more than 5 million rows of new data. The DBI hosts 1,340 sessions in a typical day.

The DBI is now the basis for the federal government's Integrated Performance Benchmarking System Pilot Project (IPBS), designed by the U.S. Department of Education to collect federal program data from states over the Internet.

Benefits

More information for improved decision-making

The state legislature wanted better school finance data for better accountability and decision-making. And that's what they got with the DBI/WebSTER solution.

"The data we now have available for the first time is directly driving better decision-making, supporting school improvement and accountability," says Heiligman.

For example, before the DBI/WebSTER solution, the state had no clear idea how much it cost to meet the legislature's quality education goals. The data now available have enabled the department to construct a Quality Education Model, including a mechanism to forecast the financial requirement to meet those education goals.

Refocusing personnel for greater overall productivity

School finance data are available more quickly than with the previous, manual solution. Heiligman estimates the department is able to produce a complete set of annual financial data for schools and districts in just half the time it previously took to produce less-complete information. Annual data is now available within six months after the academic year ends, more than six months sooner than with the previous solution.

Microsoft®

With the DBI/WebSTER solution, the state is able to refocus about 20% of its school finance staff to other valuable tasks. And with up-to-date information publicly available on the Web, the department frees up additional personnel who used to spend time on the phones, answering questions from the public.

"Instead of tabulating data, our staff can better analyze it," says Heiligman. "As a result, we're much more productive."

Flexibility to meet new needs

The open, modular and standards-based architecture of the DBI/WebSTER solution gives it the flexibility to address additional needs that the department didn't anticipate when it first sought a way to implement legislated reporting requirements. For example, in the midst of implementing DBI, the department expanded the project to automate federally-mandated collection of census data for students enrolled in and receiving special education services. The solution is also expected to create efficiencies for Oregon in federal reporting of financial and performance data as the federal government and other states move to the Federal IPBS system — based on DBI/WebSTER.

Meanwhile, Oregon continues to find new ways to put its solution to work. For example, the integration of Report Card data – information on school performance – into the DBI is another benefit that the state has realized in the past year that was not anticipated at the beginning of the project, according to Heiligman. Combining these databases has created a number of efficiencies in collecting, storing and displaying data.

For More Information

About KPMG Consulting

1676 International Drive
McLean, VA 22102

Web site:
http://www.kpmgconsulting.com/

KPMG Consulting is a leading global business advisor and systems integrator. It employs more than 10,000 people and serves 2,500 clients in both the public and private sectors. Headquartered in McLean, Virginia, it has principal offices in the United States and 16 other countries around the globe. KPMG Consulting consultants learn their clients' business problems, the trends impacting their industries, and the processes required to achieve results.

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Business Intelligence in Education Within Reach

White Paper

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Microsoft

Contents

Introduction

At no time in the past have organizations had the capability to gather and store such vast amounts of data: student information and operational data from multiple sources flow into the district with ever-increasing volume and speed. More than ever, states and districts are turning to business intelligence as the means to derive *value* from the incredible volumes of data that can now be collected from various district and school information systems.

Business intelligence (BI) is the means by which organizations interpret this sea of data to derive insights that are critical to competing in the new economy: a deeper understanding of learning environment and student achievement relationships, key performance indicators, and a consistent view of the learning environment from the administrative level to the teachers and students on the front lines. By translating these insights into action, districts can improve student achievement, respond more quickly to students or sub-groups which may be falling behind, and improve accountability by giving everyone an accurate view of the educational environment.

Traditionally, BI systems have been associated with high costs of entry: BI requires significant investment in hardware and software, as well as expensive skills training. Unfortunately, these costs have kept BI—and its benefits—out of reach for many educational organizations. Nevertheless, the question facing many states and districts is not *whether* to invest in BI, but how to derive maximum value from an investment in these systems.

Even with BI solutions in place, many organizations discover that because of the sophistication of the applications, tools, and technologies for reporting, querying and analysis, BI remains out of reach of the greatest segment of users: the administrators and educators on the front lines of improving student achievement. Yet it is these individuals who are increasingly called upon to make fast, accurate decisions, and who can benefit most from access to BI.

Today, a new generation of solutions built on the Microsoft® Business Intelligence platform puts BI within reach of both organizations and information workers within those organizations. For organizations, including small- to medium districts as well as large districts and state level education departments, cost-effective solutions that leverage existing applications and IT infrastructure eliminate many of the barriers to entry, such as the initial investment and the administrative costs associated with these systems. And through ease of use and integration with a broad range of desktop productivity and intranet applications, solutions built on the Microsoft BI Platform make BI available to a wider base of users within the organization, empowering the many individuals now called on to make fast, informed decisions as part of their daily routine.

This paper introduces the Microsoft BI Platform and demonstrates how solutions that extend BI to all levels of the organization deliver a higher return on the investment in data management and analysis systems as well as increased competitive advantage through faster, more informed decision making.

Business Intelligence for Everyone

Traditionally, analysis and reporting on enterprise business data has been the realm of dedicated analysts. Now, with increasing pressure to shorten the decision cycle and decrease expenses, these tasks are becoming a part of the daily routine for information workers in every facet of the organization.

BI solutions that are tailored to the meet specific needs help staff remain productive, allowing them to remain focused on their most important responsibilities rather than learning or implementing new technologies and tasks. The Microsoft BI platform includes the building blocks for flexible solutions designed to meet the specific needs of a district or state accountability and assessment solution. These tailored solutions deliver intuitive tools that enable information workers to incorporate advanced decision-making processes into their daily routines. For example:

- A solution that aggregates assessment results, student information, and curriculums can help identify if certain lesson plans are more effective for specific groups of students than others.
- A learning management system that captures specific information on the learning environment directly into a data warehouse can provide real time feedback on the most effective practices for forward looking replication to other areas.
- A Web base portal that provides information on student achievement to parents and the community can encourage parental evolvement in the learning process and even track their level of participation to help identify students that may benefit from additional assistance

The following sections discuss the ways solutions built on the Microsoft platform overcome the challenges traditionally associated with BI, to make sophisticated analytical solutions accessible to more states, districts and users within users within them.

Lower Acquisition Costs

In the past, organizations had to purchase specialized hardware and software to create a BI solution. Unfortunately, for many small- to mid-sized organizations, high costs alone kept BI solutions out of reach.

Microsoft helps districts and states obtain BI cost-effectively by leveraging existing applications and IT infrastructure to dramatically reduce the initial investment and the administrative costs associated with these systems. The Microsoft approach to BI incorporates familiar tools—many of which may already be deployed within the organization. By integrating BI capabilities with a broad range of desktop productivity, database server and intranet applications, solutions built on the Microsoft platform make BI available to a wider base of users.

Reduced End-User Training

BI tools have traditionally been among the most complex. They typically required special training, which increased costs and/or forced the organization to offer the tools only to select users. The need for specialized training also created barriers for the information workers who needed casual access to BI data but who did not have the necessary training. As a result, only a fraction of the organization could benefit from these BI tools.

In contrast, Microsoft BI solutions include familiar, easy-to-use desktop productivity tools, which enable any end user in the organization to quickly analyze business data. This minimizes training costs and reduces the learning curve for new users. Using familiar desktop

applications also makes BI accessible to more users—especially important now that analysis is a common part of the daily routine for increasing numbers of workers.

Integration

Organizations researching BI initiatives frequently encounter two drawbacks. On the enterprise level, many BI systems require modifications to existing operational systems or databases, or worse, require that data be migrated to the new platform. On the desktop these same systems may require that users understand and perform sophisticated tasks in order to access these new line-of-business systems.

The Microsoft BI platform overcomes these shortcomings by enabling BI solutions that integrate seamlessly with the existing computing environment. Whether data is stored in several distributed systems or in a centralized data warehouse, the Microsoft BI platform allows companies to access the data and deliver it to the enterprise for analysis. To avoid inefficient, piecemeal implementations that can drive up the cost of ownership without delivering all of the expected benefits, Microsoft BI systems offer a complete, comprehensive integrated package with a common look and feel.

Interactive Analysis

Most companies may already use some form of BI—for example, monthly reports on key performance indicators. But in the most common scenarios, the intelligence takes the form of static reports, which offer limited usefulness. In addition, preparing these reports typically requires the assistance of an IT professional or data analyst. If that person is swamped with requests, or if reports take a while to run, there can be a delay between the request and the report. Those minutes or hours can be crucial in today's fast-paced competitive environment.

Microsoft BI solutions help overcome the limitations of the static reporting model by enabling information workers to interact directly with data stored in company systems. Instead of waiting minutes or hours for someone else to run a query and report results, these users can explore data at will and receive results "at the speed of thought." BI applications that enable users across the organization to conduct their own queries and reports against the Microsoft BI Platform help organizations promote BI from a simple reporting function to a mission-critical solution. Implementing flexible, end-to-end solutions that enhance every aspect of the business helps more people make better decisions faster and achieve and maintain competitive advantage.

Integrated Collaboration

Shared knowledge has become crucial to success, as districts strive to work collaboratively to improve student achievement. Working together successfully begins with shared knowledge and insight. Unfortunately, traditional BI systems typically do not provide a way to easily share critical business insights across departments or entire organizations. In particular, the static reporting model described above limits the ease or extent to which insights can be published or shared throughout the organization.

By allowing users to easily publish and share their insights with their peers, Microsoft BI solutions help ensure that everyone in a company shares a common view of key metrics, performance indicators, and other accountability information. Powerful, easy-to-use information portals and digital cockpits aggregate and deliver BI, making it easy for staff to rapidly search and retrieve information as well as organize and share knowledge efficiently. Using these technologies, knowledge workers can also find experts among their peers and subscribe to key accountability and assessment information.

Closed-Loop Analysis

Unlike BI systems that end with reporting, Microsoft BI solutions provide districts an advantage by enabling staff to act immediately on their insights. These solutions help ensure that decisions are not only better informed; they are based on actual data and implemented faster than ever before.

Microsoft BI solutions streamline every stage of the decision cycle by providing unprecedented speed and ease-of-access to the critical data needed for each type of analysis as well as a means for integrating real-time transactional data into decision-making processes at both the administrative and classroom level. Rich features such as SQL Server Analysis Services Actions enable decision makers to "close the loop" from decision to action by linking analytical tasks with business processes. The result is an automated, finely tuned feedback loop that can help your district respond with once-unimaginable speed and accuracy to fast-changing conditions.

The Microsoft Business Intelligence Platform

The Microsoft BI platform provides the foundation for end-to-end solutions that provide both sophisticated data management and easy-to-use analysis and reporting tools. The platform centers on Microsoft SQL Server™ 2000 with Analysis Services and Microsoft Office XP, and integrates data sources such as student information, assessment data, ERP and HR data, curriculum information, learning management systems, teacher proficiency, and classroom information with familiar desktop applications for analysis and reporting.

The technologies that comprise the Microsoft BI Platform provide the building blocks for cost-effective solutions, which eliminate the need for highly specialized software and highly specialized skills. Solutions can be rapidly tailored to the unique needs of a particular industry, line of business, and even specific user segments. Through a variety of front-end tools, including Microsoft Office and Data Analyzer, Microsoft BI solutions enable all users—regardless of technical expertise—to dig into district data and unlock the value that lies hidden within.

SQL Server 2000 and SQL Server Analysis Services

Built on SQL Server 2000 platform, Microsoft BI solutions include a relational database for storing data from across the enterprise; tools to extract, transform, and load data from the organization's existing systems; SQL Server Analysis Services, an OLAP engine for doing fast, ad-hoc analysis; data mining capabilities for surfacing trends and patterns; graphical administration interfaces to easily chart and monitor information; and support for a wide range of front-end client tools—in short, a complete, end-to-end platform for analysis.

SQL Server 2000 Analysis Services provides fast access to business data by creating multidimensional cubes from information in the data warehouse. Analysis Services offers sophisticated analytical capabilities and can work on large volumes of data in the most demanding environments. Together with SQL Server, Analysis Services offers everything needed to build analytical applications at lower total cost of ownership by simplifying creation and maintenance, and by linking analytical tasks to business processes. Analysis Services also contributes to agility, enabling users to act immediately on analytical insights, and enabling the business to respond extremely quickly to dynamic conditions.

Analysis Services works with a broad range of front-end client applications, including Office, browser-based applications, and mobile devices via an intranet, the Internet, or even while offline. This enables organizations to quickly deploy BI portals and custom analytical applications that deliver the full power of BI to every desktop in the company.

Components of SQL Server that support business intelligence include:

- **Analysis Services**. The measure of any business intelligence solution is in its ability to derive knowledge from data—digging through large volumes of information to identify patterns, trends, rules and relationships that are beyond simple human analysis. SQL Server 2000 Analysis Services provides a set of integrated, Web-enabled analysis services that include Online Analytical Processing (OLAP) and sophisticated data-mining features.
- **Data Transformation Services**. SQL Server 2000 Data Transformation Services (DTS) provides the tools to consolidate data from diverse operational systems and databases into the data warehouse or data marts that support analysis and decision making. Using DTS, your organization can automate extraction, transformation, and loading among and between disparate sources. DTS can run these tasks at scheduled intervals or in response to specified events, enabling you to create data movement solutions that meet the specialized needs of your organization.
- **Data access standards**: OLE DB and XML. Open standards help ensure the flexibility and longevity of your BI system by providing forward and backward compatibility with other data sources and facilitating integration of third-party applications and components. These standards expand access to BI by increasing the flexibility for developers to incorporate analytical data within applications that reside on the Internet or that are hosted by another company. Users can achieve a new level of pervasive data analysis because they have access to data from any client, ranging from a PDA to an Internet-enabled phone, laptop computer or PC.
- **Metadata Services**. An enterprise standard for "metadata"—data about data—is critical to unifying distributed, multiple data marts into a global data warehouse. SQL Server 2000 Metadata Services helps businesses build, maintain, and manage their data warehouses by providing a shared facility for expressing the inter-relationships among the various parts of the application.

Microsoft Office for Business Intelligence

Tight integration between SQL Server Analysis Services and Microsoft Office puts the power of BI in the hands of more people than ever, enabling sophisticated analysis of large datasets using familiar tools. Through built-in support for SQL Server Analysis Services, Office provides easy access to enterprise data from the desktop. With the analytical capabilities of Microsoft Excel and data visualization tools including MapPoint™ and Data Analyzer, the Microsoft Office System extends the capabilities' of SQL Server Analysis Services, allowing users to drill down through detail, slice and dice to view different dimensions, and view and analyze data relationships graphically. Using the analysis and presentation capabilities of Office, virtually any user can analyze data stored in SQL Server Analysis Services data, and easily share intelligence with colleagues and peers throughout the organization.

Microsoft Office offers the following:

- **Analysis of SQL Server Analysis Services data.** Excel enables all information workers—whether they are business analysts or other professionals—to access, process, analyze, share, and display enterprise data in a familiar, powerful desktop setting. The powerful Excel analytical engine, Excel PivotTable® and PivotChart® reports can also be built into custom applications and portals using the Office Web Components.
- **Visualization tools.** Microsoft Office also includes applications specifically designed for data visualization and geospatial analysis, which enable users to explore data sets graphically and conduct ad hoc analysis in a simple, yet powerful interface.

  Microsoft Data Analyzer extends the BI capabilities of Office by adding rich visualization and graphical views that enable users to rapidly identify opportunities and trends, find anomalies, and review multiple sets of data.

Microsoft MapPoint provides a cost-effective way for organizations to include geographic and demographic dimensions in their BI. MapPoint solves many of the ease-of-use, compatibility, and cost problems inherent in large-scale geographic information systems while enabling users to track metrics by area and analyze district data alongside demographic information.

- **Support for custom analytical solutions.** The Microsoft BI platform also supports solutions for specific areas, such as student information, curriculum management, and NCLB reporting. The new SQL Server Accelerator for BI reduces the time it takes to build and deploy a customized BI solution by putting existing best practices to work. With the SQL Server Accelerator for BI, a BI solution can be quickly customized to meet the unique needs of an organization and its users.
- **Rich publishing and collaboration tools.** Because Microsoft Office applications include powerful features that enable collaboration among teams and organizations, users of BI solutions built on Office can collaborate on analysis and subsequently share the resulting intelligence with their peers. Office solutions enable the organization to deliver BI functionality within and alongside world-class reporting, document creation, and presentation tools. These tools enable users to share intelligence and act upon it immediately.

  In conjunction with SQL Server Analysis Services, Office technologies such as SharePoint™ Portal Server and the Office Web components allow organizations to aggregate BI from across the enterprise into a searchable portal, providing all employees with rapid access to information as well as the tools to organize and share knowledge efficiently. BI portals provide workgroups and teams with a common view of metrics, key performance indicators, and other business information, and users can publish BI from Office XP applications directly to a portal.

Conclusion

The Microsoft BI Platform provides the building blocks for complete, end-to-end BI solutions. Seamless integration between world-class database management, sophisticated analysis services, enterprise servers, and exceptionally flexible, easy-to-use front-end applications make the power of BI accessible to users at all levels of the organization. As a result, businesses realize benefits in these key areas:

- **Lower Cost of Ownership.** The world's leading productivity suite, Microsoft Office is a familiar fixture in business today. By incorporating Office applications and technologies into a BI solution, organizations benefit from employees' familiarity with the tools as well as the unparalleled support and ease of use. Familiarity with Office can dramatically reduce training and support costs for a new BI solution.
- **Increased Return on Investment.** By integrating a BI solution with the existing desktop environment, organizations make BI tools available to a larger segment of users, and increase the number of employees who can make informed, BI-based decisions and share their knowledge and best practices with other employees.
- **Business Agility.** Providing broader access to BI across the organization ultimately makes the organization more agile and more competitive by empowering all employees to make faster, better decisions based on common understanding of your markets, your customers, and the data that shapes your business.

Teachers Retirement System of Georgia (TRSGA)

Agency Provides Better Service and Improves Efficiency with New IT Architecture

CASE STUDY

Posted: May 6, 2004

Back to Previous Page

Teachers Retirement System of Georgia

Solution Overview

Company

Teachers Retirement System of Georgia (TRSGA)

Customer Profile

The Teachers Retirement System of Georgia (TRSGA) manages the retirement funds of teachers at public schools and universities in the state and of employees of the public school systems.

Business Situation

Inefficient paper-based processes and an aging mainframe system led TRSGA to seek a new solution, with Web-based Self Service capabilities that could help the agency handle more work without increasing its staff.

Solution Description

The agency worked with BearingPoint to implement a Microsoft® Windows®-based solution that includes a new database infrastructure, new accounting software, and Web-based functions for customers.

Benefits

- Better use of IT resources
- More work done without adding staff
- Better self-service options for

The Teachers Retirement System of Georgia (TRSGA) is one of the nation's largest retirement systems, with more than U.S.$38 billion in assets and a membership list of more than 270,000 teachers and other employees of the state's public schools. The demise of an aging mainframe system that handled pension administration functions forced TRSGA to find a new IT solution. Working with BearingPoint, a Microsoft global alliance partner and Gold Certified Partner, the agency deployed a three-tiered IT architecture using a variety of components, including Microsoft Windows 2000 Server, Microsoft SQL Server 2000, and Microsoft Business Solutions–Great Plains software. The solution will be fully deployed in 2004, helping agency employees to work far more efficiently and making it possible for beneficiaries to monitor and manage their account information on the Web.

customers

Partner(s)
BearingPoint (formerly KPMG Consulting)

Software and Services
- Microsoft ASP.NET
- Microsoft Business Solutions-Great Plains
- Microsoft Office XP Professional
- Microsoft SQL Server 2000
- Microsoft Visual Studio .NET 2002
- Microsoft Windows 2000 Server

Vertical Industries
Public and Nonprofit Sector

Country/Region
United States

Audiences
Business Decision Makers

BearingPoint

Situation

The Teachers Retirement System of Georgia (TRSGA) administers the retirement funds for the state's public school educators, many employees of Georgia's public universities, and other designated employees in education-related work environments. TRSGA services a plan that guarantees a monthly benefit payable for the life of the member and, when applicable, for a member's spouse or beneficiaries. With more than U.S.$38 billion in assets, an annual beneficiary payroll of more than $1.3 billion, and approximately 270,000 members, TRSGA is one of the largest public retirement systems in the United States.

In the past three years TRSGA has faced a number of technical and functional problems with its existing pension administration IT system. Many of these issues centered on an aging mainframe computer containing middleware components nearing end of life.

Agency management recognized that the system, which was designed to handle the clientele base of 20 years ago, would not be able to keep pace with the increasing workload that will be generated over the next decade as people of the baby-boom generation retire. Moreover, the agency determined that the mainframe-based business processes required extensive revision to meet business objectives. The application running on the mainframe was not a relational database and could not readily provide the kinds of detailed, cross-referenced data that pension fund administrators need for upgrading policies, responding to legislative mandates, managing workloads, and administering other business activities. The system itself was becoming too costly to maintain, and external support for much of its functionality would end in July 2004.

In addition to addressing its mainframe issues, TRSGA wanted to overhaul its inefficient, costly business processes, such as the manual and paper-intensive steps the agency used for entering and managing beneficiary information and accounts.

TRSGA decided to replace its existing infrastructure and older system with an integrated, Web-enabled client/server architecture that could help the agency improve customer service while handling an increasing number of retirees. The agency also wanted to provide members and benefit recipients with self-service options through the Internet.

Solution

For help with the design and deployment of a new IT architecture and with modifications to its business processes, TRSGA turned to BearingPoint, a Microsoft® global alliance partner and one of the world's largest business consulting, systems integration, and managed services firms.

> "We felt that a Microsoft-based solution would provide the best answer to address the agency's needs and would integrate seamlessly with some of the products that TRSGA

employees were already familiar with.”

Tom Zacharias
Senior Manager, BearingPoint

In collaboration with many business and technical decision makers at TRSGA, BearingPoint designed a system called the Pension Administration Services Solution, or PASS. PASS is based on a three-tiered IT architecture that uses a centralized data repository and automates customer service functions to reduce the turnaround time required to process member and retiree requests for information and services. The new system is lowering the administrative costs associated with manual and paper-based systems by providing a more efficient internal accounting system as well as electronic processing for activities such as new enrollments, salary deductions, payroll reporting, and benefit payments.

PASS integrates across the agency's systems and allows for multiple points of entry for customer service requests. Specifically, it fulfills TRSGA's request to make certain functions and information available on the Web, so plan members can calculate benefit estimates and submit online applications for service requests.

Although TRSGA did not specify particular products during the bid process, the agency already used Microsoft products for some of its networking systems and PC desktops.

"We felt that a Microsoft-based solution would provide the best answer to address the agency's needs and would integrate seamlessly with some of the products that TRSGA employees were already familiar with," says Tom Zacharias, BearingPoint's Senior Manager on the project. "Plus, the TRSGA management felt—and we agreed—that the size, stability, and track record of Microsoft products would provide benefits over the long term, including the ability to build and deploy new functionality to meet the future needs of the retirement system."

Greg McQueen, TRSGA's Director of Information Technology, adds that TRSGA chose BearingPoint because of the solution provider's extensive experience with public retirement systems and large-scale systems integration projects.

"We selected BearingPoint to help us implement our pension administration services solution because of its highly qualified staff, its close association with Microsoft, and its integration of Microsoft components and products into the solution," McQueen says. "Our project has a tight timeline with complex deliverables. BearingPoint has helped our project remain on schedule and allowed us to deliver quality products to our business

units."

The solution involved several phases, including implementation of Microsoft Business Solutions–Great Plains® software for general ledger and accounting, and Microsoft Windows® 2000 Server and Microsoft SQL Server™ 2000 Enterprise Edition, which are both part of Microsoft Windows Server System™ integrated server software. BearingPoint, which used Microsoft Visual Studio® .NET development system for Web development work, integrated the Microsoft components with a FileNet document imaging and workflow system, which helps electronically capture and route paper documents already in the system as well as documents that will continue to arrive by mail or fax until the solution is fully deployed by the end of 2004. Employees use Microsoft Office XP Professional on their desktops. Zacharias says the organization also plans to upgrade the core operating system to Windows Server™ 2003 after other project components are in place.

Benefits

Solution Frees Up IT Resources

McQueen says the agency's financial services division—burdened by an accounting system that was developed in the 1980s—saw almost immediate improvements following the deployment of the Microsoft Great Plains software.

"We deployed Great Plains at the beginning of the fiscal year to minimize any disruptions to balancing and reconciliation work. The accounting staff was able to quickly take advantage of far better reporting and other accounting functions with Great Plains," McQueen says. "Also, as the development timeline was relatively short, other business units could quickly see the benefits of technology upgrades."

Ron Thomas, TRSGA Project Manager for PASS, notes that before the Microsoft Great Plains software was installed, TRSGA staff members would frequently ask the IT department to compile reports—a relatively cumbersome and time-consuming process that required the skills of an IT staffer with enough knowledge to navigate through the mainframe-based pension administration application.

"Now the staff can take on many of the reporting tasks themselves because the Windows-based Great Plains software is so much more intuitive," Thomas says. "This frees up our IT people to perform actual technology work instead of performing tasks

such as doing research for use in creating accounts payable reports."

Handling More Work without Increasing Staff

As part of the implementation of the new payroll module, BearingPoint converted more than 40 million records from the mainframe system and ported them to the SQL Server database. It is expecting to convert 60 million additional records when implementing the membership module.

"SQL Server provides the scalability and the functionality to perform all the tasks required of it by TRSGA," says Thomas. "The system uses SQL Server stored procedures for batch processing—for example, for executing the monthly payroll. We also designed the solution with database triggers for audit trails."

> **"This solution should create additional capacity in our business units, make internal operations more efficient, and provide better service to our customers."**
>
> **Greg McQueen**
> Director of Information Technology, Teachers Retirement System of Georgia

By using Visual Studio .NET and Microsoft ASP.NET, BearingPoint created a means of providing retirees with Web-based access to their payment history records. As the solution is rolled out, TRSGA is making other data accessible through the Internet to help promote self-service and reduce the amount of work conducted at its call center. Additional online information and functionality will include the ability for members to calculate benefit estimates, submit applications for benefits, purchase service, and enter service requests that will be routed automatically to the proper department within the agency.

"This solution should create additional capacity in our business units, make internal operations more efficient, and provide better service to our customers," says McQueen. "With the baby boomers retiring in the next few years, we expect to see our workload increasing dramatically. But with this new technology in place, we will be able to handle greater volumes of work with the same amount of staff."

Microsoft Windows Server System

Microsoft Windows Server System integrated server infrastructure software is designed to support end-to-end solutions built on Windows Server 2003. It

creates an infrastructure based on integrated innovation, Microsoft's holistic approach to building products and solutions that are intrinsically designed to work together and interact seamlessly with other data and applications across your IT environment. This allows you to reduce the costs of ongoing operations; deliver a more secure and reliable IT infrastructure; and drive valuable new capabilities for the future growth of your business.

For more information about Windows Server System, go to:
www.microsoft.com/windowsserversystem

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For more information about BearingPoint products and services, visit the Web site at: www.bearingpoint.com

For more information about Teachers Retirement System of Georgia products and services, visit the Web site at:
www.trsga.com

Microsoft Windows Server 2003

Microsoft Windows Server 2003 Customer Solution

Kentucky Department of Education Reduces Total Cost of Ownership with Windows Server 2003 and Exchange Server 2003

Published: April 2003

The Kentucky Department of Education (KDE) is reducing the total cost of ownership for its statewide educational network with Microsoft Windows Server 2003, Active Directory directory service, and Exchange Server 2003. Active Directory will enable KDE to centralize the management of core domain and network services without compromising the level of autonomy that local school districts require to service end users. Increased scalability and reliability enable the department to begin moving to a hosted services model, with all the financial benefits provided by economies of scale. KDE also will benefit from greater stability, improved security, and reduction of complexity at both state and district levels—all helping to reduce costs and allocate more resources to educating Kentucky's children.

Situation

A result of the Kentucky Education Reform Act of 1990, the Kentucky Education Technology System (KETS) was created to provide equitable access to technology for all public school students and teachers in grades kindergarten through 12 (K-12). For the Office of Education Technology (OET) in the Kentucky Department of Education (KDE), delivering on this goal requires maintaining a stable, robust, reliable, and secure network infrastructure spanning 1,400 schools in 176 districts. In all, the KETS environment supports more than 700,000 people, including 600,000 students and 125,000 teachers, school staff members, and KDE employees.

From an infrastructure perspective, the KETS environment consists of more than 4,400 servers, 3,500 of which are running the Microsoft® Windows NT® Server operating system version 4.0. Of those servers, 1,200 run Microsoft Proxy Server version 2.0, 320 run Microsoft Exchange Server 5.5, 700 run Internet Information Server version 4.0, and 1,300 run the state's standardized student management system. Those 3,500 servers reside in 300 stand-alone Windows NT domains, with approximately half of them running as backup domain controllers. Under the Windows NT domain model, all district-level information technology (IT) resources have full administrative rights over their local environments.

As the KETS infrastructure was deployed over the last decade, the goal was to ensure technical self-sufficiency at the local district level. Therefore, the enterprise is based on a distributed support model, which in essence requires that the technical capacity to implement, maintain, and

PROFICIENCY AND BEYOND

Kentucky Department of Education

Solution Overview

Customer Profile
The Kentucky Department of Education (KDE) maintains 1,400 schools in 176 districts.

Business Situation
KDE needed to improve the manageability, stability, and security of its statewide infrastructure.

Solution
KDE is upgrading to the Microsoft® Windows Server™ 2003 operating system and deploying the Active Directory® directory service.

Benefits
KDE will realize a lower total cost of ownership through:

- Greater economies of scale
- Improved network stability
- Better security
- Reduced complexity at both state and district levels

Software and Services
Microsoft Windows Server 2003
Microsoft Exchange Server 2003
Microsoft Consulting Services

Hardware
3,500 servers statewide

Partners
Hewlett-Packard
Dell
Pomeroy IT Solutions
Accent Systems Inc.

Microsoft®

replace all technology components be established at the local district level. As a result, local districts have historically possessed a large degree of autonomy, with any centralized, state-provided IT resources limited to an advisory role.

As the environment grew in both size and complexity, the ability to manage a distributed infrastructure became increasingly difficult at both the district and the state level. Each district managed its environment differently, according to the skill levels and preferences of district-level IT resources. Servers were deployed in a variety of configurations, with the majority not being proactively updated with the required software updates and critical security patches. The statewide KETS environment had become unmanageable and was failing to deliver the security and reliability required of it.

"The KETS network had reached the point where its integrity was in jeopardy," says Chuck Austin, KETS Senior Project Manager at KDE. "Our inability to effectively manage the distributed infrastructure has led to widespread, service-impacting issues such as malicious code crippling the entire network, loss of functionality due to poor patch management practices, and loss of critical data due to poor disaster-recovery processes. All of which result in unnecessary downtime for critical instructional and administrative resources. Additionally, the centralized IT resources that we have were always reacting to crises as opposed to proactively managing services."

According to Austin, one key challenge with the distributed support model has been the level of skill required at the district level. "Few districts have been able to acquire the level of technical expertise needed to effectively manage their own environments," he says. "The education business model needs to remain structured around educating Kentucky's children, not around building self-sustaining IT super-centers. We need to centralize the management of core network resources while preserving the autonomy required for local administration at the district level."

Solution

To address these challenges, KDE is upgrading the KETS domain infrastructure to the Active Directory® directory service running under the Microsoft Windows Server™ 2003 operating system, Standard Edition and Enterprise Edition. The new architecture for the KETS environment will be a single Active Directory forest with 178 domains: a root domain, one for KDE employees, and one for each of the 176 school districts in the state. Combined with the delegated administrative capabilities of Active Directory, this design will help enable the security and central management of all critical KETS network resources while it provides school districts with the level of autonomy required for local system administration. Active Directory Organizational Units will be created for students, staff, and local computing resources at the local domain level, ensuring that all domains joined to the forest have a consistent high-level organizational structure.

"We had many business processes that needed to change, and deploying Windows Server 2003 with Active Directory provided an opportunity to refocus and do it right," says Phil Coleman, Director of School Network Services at KDE. "We see our migration as more of a business upgrade than a technical one. By eliminating complexity at the district level, we have enabled districts to reduce costs and increase their focus on education. Our team can shift to a proactive mode of operation, which will increase security and network stability yet decrease our workload. We'll be able to focus on meeting new and emerging business requirements that will improve education instead of spending all our time keeping our existing environment running."

"We had many business processes that needed to change, and deploying Windows Server 2003 with Active Directory provided an opportunity to refocus and do it right. We see our migration as more of a business upgrade than a technical one."

Phil Coleman
Director, School Network Services
Kentucky Department of Education

Reaching a Decision

KDE's decision to upgrade from Windows NT 4.0 was not a sudden one. The KDE Enterprise Systems team realized several years ago that its distributed support model was failing and had already begun to explore its options. "Code Red and Nimda opened our eyes to the magnitude of the problem we faced," says Coleman. "We realized that we had to center our business around supporting enterprise-side services, and Active Directory is the enabler that allows us to do so. Simply deploying a new operating system would not have solved the problem."

In November 2001, after spending 18 months working toward a solution based on Microsoft Windows® 2000 Server and Active Directory, KDE realized that it lacked the technical expertise and practical experience required to deploy directory services in such a large environment. The project was redirected as KDE enlisted the aid of partners that could ensure the project's success.

"All servers that are running business-critical applications on Windows NT are targeted for migration to Windows Server 2003 by the end of the year."

Chuck Austin
KETS Sr. Project Manager
Kentucky Department of Education

By July 2002, the project team was fully formed. KDE selected Hewlett-Packard (called Compaq Services at the time) as the primary migration partner, bringing to the team what Austin knew it needed: real-world experience deploying Active Directory in enterprise environments. KDE engaged Microsoft Consulting Services (MCS) to provide architectural guidance and engineering expertise, and enlisted a full-time technical account manager from Microsoft's Enterprise Services group. Additionally, Accent Systems Inc. has been engaged to provide the implementation team that will field this deployment across all 176 school districts, and Pomeroy IT Solutions has provided the required ongoing project management and testing resources needed throughout the planning, assessment, design, testing, and piloting process.

During the team-building phase, KDE was offered the opportunity to participate in the Windows Server 2003 Rapid Adoption Program (RAP). "We jumped at the opportunity to join the RAP and begin working with Windows Server 2003 ahead of its formal release," says Austin. "In addition to providing several attractive new features, our deployment of Windows Server 2003 will reduce our total cost of ownership over an extended period of time. The K-12 environment requires an enterprise platform with a life span of at least three to five years, and Microsoft's road map for Windows Server 2003 and beyond provides this needed longevity."

Deployment Timeline and Process

Rollout of Windows Server 2003 and Active Directory began in February 2003, with the Kentucky Department of Education headquarters strategically targeted as the first pilot site. Six school districts are scheduled to participate in the pilot implementation in April, with the remaining 170 districts scheduled for migration between May and November 2003. In addition to finishing the Active Directory migration this year, Austin plans to have the majority of all Web, database, and application servers in the KETS environment upgraded to Windows Server 2003 before the end of the year. "All servers that are running business-critical applications on Windows NT are targeted for migration to Windows Server 2003 by the end of the year," he says. "We may still have some file and print services running on Windows NT Server, but I can live with that."

During the Active Directory rollout, each school district will receive two new Dell servers—to be fully managed by the KDE Enterprise Systems team. The first server will be a domain controller, and the second server will function as a domain controller and Global Catalog server. Each server also will provide three core network services—Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), and Windows Internet Naming Service (WINS)—to ensure that each district has a level of redundancy built into its network infrastructure.

"We're building in a level of stability and redundancy for core directory and network services that we've never had before," says Tim Cornett, Active Directory Architect at KDE. "By consolidating domain and network services management, we can take advantage of economies of scale and engineer our infrastructure for greater stability and security. And by adopting enterprise change and configuration management, we can limit ill-advised modifications that could hinder crucial service delivery."

KDE is taking several steps to ensure consistency in rolling out its new environment, including starting with standardized hardware configurations. As each school district is migrated to Active Directory, the two new servers controlling its directory and network services will be deployed in a proven, consistent configuration through a standardized process—an approach that will help the Enterprise Systems team troubleshoot any future issues with far greater efficiency. The following seven steps will help ensure a trouble-free, consistent upgrade process:

- Introduction of a temporary server running a controlled, proven image of Windows NT 4.0 as a backup domain controller.
- Promotion of the new backup domain controller to a primary domain controller.
- Upgrade of the new primary domain controller to Windows Server 2003, which creates the new child domain in the forest and imports all existing accounts.
- Addition of two new servers running a clean installation of Windows Server 2003 to the local domain as member servers.
- Promotion of the two new servers to domain controller status.
- Transfer of the Flexible Single Master Operations (FSMO) and Global Catalog roles from the temporary server to the new Windows Server 2003 domain controller.
- Removal of the temporary server from the environment.

"Active Directory is the foundation for many of the new capabilities that we'll enjoy with Exchange Server 2003—tools that will enable us to better manage our environment and eliminate many of the headaches that we now face."

John Logan
Exchange Architect
Kentucky Department of Education

Microsoft Exchange Server 2003

Following the Active Directory rollout, the KETS network will be significantly more cost-effective, robust, and supportable. But rolling out Active Directory is only the first step in KDE's plans. Once the Active Directory rollout is underway, KDE will build on the new capabilities provided by Active Directory by upgrading its messaging environment from Microsoft Exchange Server 5.5 to Microsoft Exchange Server 2003 running on Windows Server 2003. Austin expects this effort to begin mid-year and plans to complete the upgrade by December 2003.

At a minimum, the KETS messaging environment will be consolidated from the 320 distributed servers it runs on now—with many districts having a separate e-mail server for each school—to at most one server running Exchange Server per district. However, the Enterprise Systems team's ultimate goal is to further reduce complexity at the district level by migrating all messaging services across the KETS environment onto a cluster of 15 to 20 centrally located and managed servers.

"District IT resources have expressed strong interest in centralized management of the KETS messaging infrastructure, allowing them more time to manage users," says John Logan, Exchange Architect at KDE. "Combined with Active Directory, which will support centralization from an organizational perspective, Exchange Server 2003 and Windows Server 2003 provide a far greater level of scalability and reliability than we enjoy today. These characteristics will enable

us to centralize all messaging services, resulting in greater stability, increased administrative efficiency, and better use of computing resources. District IT resources will still manage users, but they won't need to worry about the underlying systems and services that support their messaging environment."

"We're building in a level of stability and redundancy for core directory and network services that we've never had before."

Tim Cornett
Active Directory Architect
Kentucky Department of Education

In addition to enabling a centralized messaging infrastructure, Exchange Server 2003 has several new and improved features that will make life easier for the five-person messaging group on the KETS Enterprise Systems team. "As it stands today, we spend a lot of time pulling replication, dealing with viruses, and fixing backed-up X.400 queues," says Logan. "Active Directory is the foundation for many of the new capabilities that we'll enjoy with Exchange Server 2003—tools that will enable us to better manage our environment and eliminate many of the headaches that we now face."

Some features that Logan expects to be the most helpful are:

- **Increased flexibility in managing address lists.** With Active Directory, administrators can create and manage multiple global address books based on Active Directory Organizational Units. This is a key feature to KDE because many school districts require student mailboxes to be hidden from address lists outside of the district. Today, this is done through a complex, manual process: exporting the global address book, hiding students, importing the address book, replicating to the central hub, exporting the address book again, unhiding students, and reimporting the address book. Each of the 176 districts has to be done separately, so it takes a week to complete the entire KETS environment before starting the process again.
- **Better control over servers.** Through Active Directory, the messaging team will be able to consistently and immediately push new software updates out to KETS servers running Exchange Server. Combined with the improved antivirus capabilities in Exchange Server 2003, this capability will vastly improve the team's ability to respond to virus threats.
- **Query-based distribution lists.** Instead of managing distribution lists by hand, system administrators will be able to populate them through queries against user characteristics stored in Active Directory.

End users also will benefit from the upgrade to Exchange Server 2003. Nonstudent users rely primarily on the Microsoft Outlook® messaging and collaboration client, and these users will enjoy a richer and more productive experience through several improvements to the client itself—and in the way in which it communicates with Exchange Server 2003. Students primarily use Outlook Web Access, and they also will benefit from many user interface and performance improvements.

Internet Information Services (IIS) 6.0

Today, the KETS Web server environment consists of approximately 700 "official" Web servers, along with thousands of other servers and desktop PCs running Internet Information Server 4.0 or Internet Information Services 5.0. "When Code Red and Nimda hit, they brought the entire KETS infrastructure to its knees," says Austin. "We unfortunately dropped network services to 150 out of 176 districts for an extended period while we identified and eradicated this threat. In doing so, we discovered hundreds of Web presences that we weren't aware of, and consequently discovered that many weren't being patched at all. Through Active Directory, we'll be able to push patches out to all Web servers in the KETS environment consistently and rapidly."

The increased reliability, scalability, and security provided by IIS 6.0—the Web service included in Windows Server 2003—also will enable KDE to optimize its Web server environment. As with the

hosted Exchange Server infrastructure, the Enterprise Systems team's goal is a centrally managed Web server farm, with Active Directory as the mechanism for providing local districts with an appropriate level of access.

Benefits

For KDE, upgrading to Windows Server 2003 and deploying Active Directory will increase the robustness and manageability of the KETS environment, leading to lower total cost of ownership at both the state and district levels. "Going into the project, we had four requirements: reduction of complexity, lower recurring costs, improved security, and the rollout of an enterprise messaging model," says Coleman. "On the basis of our experience so far, we're confident that each of these goals will be realized."

Coleman already has reorganized his group to manage the new KETS environment, creating a core network services team that will proactively manage administration of core network services—work that was being done by hundreds of district-level resources. "Schools need to focus their limited resources on educating children, and will be able to do so more effectively as we assume management of enterprisewide IT services," says Coleman. "We're already reorganizing to work in a proactive manner and are forming a new team to focus on network and directory services. I can build this new team without additional resources because we'll no longer need to spend 80 percent of our time fixing what gets broken."

Economies of Scale

By enabling a more secure delegation of administrative tasks, Active Directory will help KDE minimize the cost of supporting its statewide infrastructure. Centralizing the management of core network services—as well as computing resources for messaging and Web presences—will help KDE to realize economies of scale that will benefit the entire organization. These economies of scale will increase as KDE begins to move to a hosted messaging and Web server infrastructure.

Reduction of Complexity

Local school districts will benefit from reduced complexity by no longer needing to attract and retain the technical expertise required to address complex network issues. Tasks requiring engineering expertise will be consistently managed across the entire KETS environment by a small group of experts—without affecting the ability of district administrative resources to serve end users.

School Network Services team members also will benefit from reduced complexity because all domain and network resources will operate in a standardized manner. Problems that occur can be resolved faster because engineers will no longer need to first determine what was done at the district level.

Stabilization of All Backbone Services

Through proper directory design and the securing of all critical network and directory services, the new KETS environment will be far more stable and robust than its predecessor. Enterprise Systems team members will be able to spend more time working proactively and less time "fighting fires."

Improved Security

With Active Directory, a central team can deploy virus protection and other software updates across the KETS environment quickly and efficiently, minimizing the effects of and costs

"Going into the project, we had four requirements: reduction of complexity, lower recurring costs, improved security, and the rollout of an enterprise messaging model. On the basis of our experience so far, we're confident that each of these goals will be realized."

Phil Coleman
Director, School Network Services
Kentucky Department of Education

associated with virus outbreaks and other security threats. The software updates and patches needed to help maintain security can be scripted and pushed out centrally in a rapid, automated, and consistent manner across the entire KETS infrastructure.

Microsoft Windows Server 2003 enables you to create a highly productive platform for powering connected applications, networks, and Web services. Windows Server 2003:

- Helps you to deliver a reliable, secure, scalable platform for applications and network services
- Makes it easy for you to deploy, manage, and use
- Empowers you with a complete server platform to quickly build connected solutions
- Enables you to maximize business value by leveraging the largest partner solution ecosystem

For more information about Windows Server 2003, please visit:
http://www.microsoft.com/windowsserver2003/

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http://www.microsoft.com/

For more information about the Kentucky Department of Education, visit the Web site at:
http://www.kde.state.ky.us/

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Microsoft Windows 2000 Server Family

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Hudson County Schools of Technology

Schools Migrate from NetWare to Windows, Gaining Reliability, $340,000 in TCO Savings

Published: November 2002

Hudson County Schools of Technology was supporting 3,500 students and 370 teachers with a mixed environment including Novell NetWare. Server availability was as low as 60 percent, and the IT staff couldn't handle more duties, although user needs were increasing. In response, the district migrated away from Novell, creating an environment based entirely on Microsoft Windows 2000 Server. The district has increased user accounts by 1,500 percent, to 3,000; server availability from 60 to 98 percent; and expanded its network to serve the entire enterprise—all without increasing IT support staff. The move to Windows saves the schools more than $340,000 per year. Without savings in total cost of ownership (TCO), the district says it would not have attempted the expansion.

Situation

Hudson County Schools of Technology is a district of public vocational technical schools for high school students and adults in Hudson County, New Jersey. Programs include adult education (high school and postsecondary), the Career Academy for nontraditional secondary school students, County Prep High School, Explore 2000 Middle School (in partnership with local school districts), High Tech High School, Juvenile Detention Center transitional education program, and more. Its full-time and part-time programs reach more than 3,500 people. The district operates with a staff of 370 faculty and administrators from two primary and two secondary facilities.

Four years ago, the district was running four server operating systems: a UNIX-based system for e-mail and Internet access, Novell NetWare and Microsoft® Windows NT® Server for applications and classroom-based instructional local area networks, and the Apple Macintosh operating system for desktop publishing. The environment was costing too much and contributing too little, according to Al Trattner, Technology Coordinator for the district.

"We were maxing out the staff that had to support our servers," says Trattner. "When we lost one of our people, it was a major issue because we lost the capability to manage that part of our environment. In public education, we don't have the ability to hire staff the way that private corporations do. The cost of someone who could handle the various segments of our mixed

HCST

Solution Overview

Customer Profile

Hudson County Schools of Technology is a district of public vocational technical schools for high school students and adults. The district serves 3,500 students with a staff of 370.

Business Situation

A mixed environment including Novell NetWare and Microsoft® Windows NT® Server had server availability as low as 60 percent, and the IT staff couldn't handle more duties, although user needs were increasing steadily.

Solution

The district migrated from NetWare to an entirely Windows® 2000–based network.

Benefits

- Without increasing staff, the district is able to increase its server population 1,000 percent, to 55 and its user accounts by 1,500 percent, to 3,000.
- Server availability has climbed from 60 to 98 percent, making the network a more reliable resource for students and staff.
- Windows 2000 gives the district the best foundation for growth; it's now planning the adoption of Microsoft .NET–connected software.

Software and Services

Microsoft Windows 2000 Server
Microsoft Windows 2000 Advanced Server
Microsoft SQL Server™ 2000
Microsoft Exchange 2000 Server
Microsoft Internet Security and Acceleration Server 2000
Windows 2000 Professional
Microsoft Office XP Professional

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environment was prohibitive. So was the cost of the hardware that we needed to keep up with our networks and services."

Beyond issues of cost, the district decided that it wasn't doing enough to support the technology needs of its students. "We needed to provide students and faculty with a powerful and educationally effective technology environment that enables access to individualized resources when and where they are needed," adds Trattner. "We weren't doing that."

"We looked at NetWare 6.0, but clearly the environment that we wanted to be in was Windows. Windows was a perfect fit for the services we wanted at both the desktop and server levels."

Al Trattner
Technology Coordinator
Hudson County Schools of Technology

Solution

The district considered but rejected the idea of consolidating its networks onto Novell NetWare. Instead, it chose a migration to the Microsoft Windows® 2000 Server family of operating systems.

"Windows was a Perfect Fit"

"We looked at NetWare 6.0, but clearly the environment that we wanted to be in was Windows," says Trattner. "Windows was a perfect fit for the services we wanted at both the desktop and server levels. The server applications and instructional applications we wanted to use were coming out first for Windows and only later for NetWare, if at all. And moving to Windows when we did positioned us for moving to Microsoft .NET later, which is appealing because it will give us unprecedented functionality to support our users. Beyond making logical sense, the choice of Windows over NetWare made financial sense as well. We're on a Microsoft School Agreement for licensing, which takes away a lot of the worries about managing a Windows environment, using it the way we want to, and keeping it up-to-date. We expect tremendous cost savings with Windows."

Indeed, as the following table shows, Hudson estimates that it will save more than U.S. $340,000 per year in reduced total cost of ownership (TCO) by migrating from NetWare to Windows.

Information technology (IT) staff efficiencies Ability to expand infrastructure without requiring two additional network managers, at $65,000 per	*Savings:* $130,000 per year
Employee productivity Eliminate the need for faculty and staff to reboot, complete multiple sign-ons, or deal with other problems related to Novell clients: 5 minutes per occurrence × 200 days per year × 185 employees affected at $50/hour average salary of affected employee	*Savings:* $154,170 per year
Reduction in help-desk calls Eliminate Novell-based problems resulting in 310 calls/year × $40 per call	*Savings:* $12,400 per year
Training and certification Eliminate need to maintain/upgrade training/certifications on NetWare	*Savings:* $20,000 per year
Active Directory®–related savings Eliminate need for professional staff to rekey data: 600 hours × $40/hour	*$24,000* per year
	Total estimated savings: **$340,570 per year**

Hudson's Windows-based solution uses 55 servers running Windows 2000 Server, including 13 servers running Windows 2000 Advanced Server to support clustering of the Active Directory directory service on two servers to ensure high availability. Network load balancing across 10

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servers for thin-client services, using Windows Terminal Services (part of Windows 2000 Server), ensures real-time performance for users.

The district uses Microsoft Exchange 2000 Server for messaging and collaboration and Microsoft SQL Server™ 2000 for data services. The district's approximately 900 desktops run Microsoft Windows 2000 Professional and Office XP Professional. Some desktops also support the Microsoft FrontPage® Web site creation and management tool, Microsoft Project, and Microsoft Visio® drawing and diagramming software. Third-party software includes Chancery Software student information systems and SNAPS Systems food services solution; Hudson plans to migrate to the Microsoft .NET Framework-connected versions of each package. It also runs Blackboard.com as an online learning solution.

An Easy, Cost-Effective Migration

Hudson managed its migration from four operating systems to Windows 2000 Server in two key steps. First, it moved to Windows NT Server to support applications for Internet access, firewall, and e-mail. It moved some of its Macintosh data files to Windows and moved its administrative network from NetWare to Windows.

When Windows 2000 Server became available, Hudson planned the second step of its migration. With a modest consulting schedule of 14 days, the district developed both immediate and long-term transition plans that continue to guide its implementation.

"Migrating from Novell Directory Services to Windows Active Directory is easy," says Trattner. The conversion of the first domain controller and the migration of user accounts were completed in one day. Backup domain controllers were added, and the district "pulled the plug on Novell," according to Trattner.

Hudson designed an Active Directory–based structure that brought the district's two primary facilities into a single domain, with separate organizational units (OUs) for administrators, teachers, and students in each building, plus another 15 OUs for the district's various programs. The single domain enables users to log on to the network and access their resources from anywhere in the district, while the OU structure enables IT managers to deploy group policies that give students, faculty, and staff only the access to which they are entitled.

"We would have had to add two network server managers to our staff if we had continued to use Novell. That would have meant another $130,000 in IT support. We wouldn't have tried it."

Al Trattner
Technology Coordinator
Hudson County Schools of Technology

Benefits

Windows 2000 Server Provides More Powerful, Feature-Rich Environment at Lower Cost

Migrating from NetWare to Windows has enabled Hudson to expand its use of technology to meet the rapidly growing needs of its community—without increasing costs. The district has added new server applications, expanded its user account population from 200 to more than 3,000, and added important new services such as secure off-campus access through Terminal Services. The district now not only provides its own Internet access services, but also provides Internet access for three other New Jersey school districts. In the process of expanding these capabilities, Hudson has enlarged its server population from 10 to more than 55—without having to add to its server support staff of eight professionals.

"We would have had to add two network server managers to our staff if we had continued to use Novell," says Trattner. "That would have meant another $130,000 in IT support. We wouldn't have tried it."

Windows 2000 Server Provides Greater Reliability, Availability

The migration to Windows 2000 Server has also boosted server availability from 60 percent to 98 percent, enabling the district to gain far more productivity from each server, while reducing per-server maintenance needs and costs. Previously, the district's NetWare servers would crash up to three times a month—necessitating hands-on support and, at times, 60–90 minute roundtrip drives across the district to provide service.

"The all–Windows 2000 environment is far more stable than anything that we've ever had before," says Trattner. "The servers just keep running. And we can conduct maintenance and troubleshooting centrally, making it easier and more cost-effective to fine-tune the environment to ensure that high level of availability. On the desktop side, we don't have the added burden of Novell clients—with the extra overhead on the desktops and the problems of resolving conflicts."

Windows 2000 Server Provides the Platform for Future Growth

"We're just at the beginning of what we can do with Windows 2000," says Trattner. "We want to integrate Windows Media® Services into Exchange Server and Microsoft Internet Security and Acceleration Server [ISA Server] to run a Web-based radio station and to offer video production courses. We're beginning to work with Microsoft SharePoint™ Team Services for online classes and staff development. We're looking at deploying Microsoft Content Management Server next year. We're using ISA Server for a firewall now, but we plan to take advantage of its filtering and caching capabilities as well. And around the corner, we envision the move to .NET.

"That's really the biggest benefit for us and our users," sums up Trattner. "By migrating from Novell to an all–Windows 2000 environment, we can do more for our users than on any other platform, and we can provide the most cost-effective environment possible."

Microsoft Windows 2000 Server is the multipurpose network operating system for businesses of all sizes. One of the latest versions of the best-selling server operating system, Windows 2000 Server lets you:

- Share files and printers reliably and securely.
- Choose from thousands of business applications compatible to run today on Windows 2000 Server.
- Build Web applications and connect to the Internet.

This combination and flexibility deliver a strong business value proposition for today's IT customer.

For more information about the Microsoft Windows 2000 Server family, go to:
http://www.microsoft.com/windows2000/server/

The Microsoft .NET Framework is an integral Windows® component that supports building and running the next generation of applications and XML Web services.

For more information about the .NET Framework, go to:
http://msdn.microsoft.com/netframework/

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http://www.microsoft.com/enable/microsoft/section508.aspx

Microsoft and Section 508

Microsoft commitment to accessible products and solutions allows us to support government in making accessible technology choices.

Section 508 reinforces the best practices that our organization already performs. We proactively educate our product teams about accessible design and the Section 508 Access Board standards.

What is Section 508 of the Rehabilitation Act?

"On August 7, 1998, President Clinton signed into law the Rehabilitation Act Amendments of 1998, which covers access to federally funded programs and services.

"The law strengthens section 508 of the Rehabilitation Act and requires access to electronic and information technology provided by the Federal government. The law applies to all Federal agencies when they develop, procure, maintain, or use electronic and information technology. Federal agencies must ensure that this technology is accessible to employees and members of the public with disabilities to the extent it does not pose an 'undue burden.' "

-U.S. Access Board

Section 508 addresses various means for disseminating information, including computers, software, and electronic office equipment.

The Access Board is responsible for developing accessibility standards for such technology for incorporation into regulations that govern Federal procurement practices. The Access Board issued their Electronic and Information Technology Accessibility Standards for Section 508 of the Rehabilitation Act in the Federal Register on December 21, 2000. The final standards help Federal agencies determine whether or not a technology product or system is accessible.

Microsoft and Section 508

As new regulations such as Section 508 raise awareness of the value of designing and deploying accessible technologies in the workplace, the implications for the estimated 54 million people with disabilities, including 8.5 million who want to work but remain unemployed are limitless.

Microsoft believes that Section 508 is good for industry, government and, most importantly, for people with disabilities. We work closely with federal IT managers and

fellow technology-industry leaders to help government comply with their new regulations. Our hope is that Section 508 will encourage more competition and innovation on accessible technology - which in turn will lead to an increased number of people with disabilities finding employment that suits their talents and skills.

Today, and in the years ahead, technology has the potential not only to create thousands of new jobs, but also to break down barriers that in the past may have prevented people with disabilities from finding productive and fulfilling jobs. Microsoft is committed to helping make this vision a reality.

Our Commitment to Accessibility

At Microsoft, our dedication to accessibility began in 1988 with the launch of Windows 2.0 and continues today with unique accessibility features in Office XP and Windows XP. Since our initial involvement with accessibility issues, we have continued our dedication to improving the accessibility of our products and creating new and better technologies that everyone can use.

Our Accessible Technology Group has more than 40 people working with product developers, assistive-technology companies and disability advocates to ensure that people with disabilities can use software developed by both Microsoft and other companies. The overall mission of this group is to make accessibility integral to our platforms, products, programs, and services.
Our strategy is:

- **Develop products, technologies and services** that are accessible and usable by all people regardless of their capabilities.
- **Build relationships** with the disability community to help us better understand and respond to customer needs.
- **Equip and motivate the development community** to produce great accessibility solutions.
- **Empower customers** with information to make informed choices about the new and existing products they use.

More Information on Section 508

For further information on Section 508 of the Rehabilitation Act, see:

- U.S. Regulations Motivate Technology Companies to Make Accessibility a Priority
- Microsoft Actively Supports Section 508
- Microsoft Product VPATs
- Federal IT Accessibility Initiative Site
- U.S. Access Board Web Site
- Department of Justice 508 Web Site

- Center for IT Accommodation (CITA)

Related Resources

Case Studies of organizations using accessible technology

Section 508 VPATs for Microsoft Products
Find Microsoft product VPATs. The VPAT (Voluntary Product Accessibility Template) is an informational tool developed by industry and government to help facilitate the new market research responsibilities of Federal IT professionals under Section 508.

More information about how Microsoft Actively Supports Section 508.

Increase Independence of Students with Disabilities Using Windows and Microsoft Word

By Subhashini Balagopal and Patti Young

Indiana special educators Subhashini Balagopal and Patti Young saw the potential of using word processing and presentation capabilities of Microsoft Windows 98 and Office 2000 for adapting activities to help students with disabilities feel successful at school and increase their independence. They shared some of their ideas at the Closing the Gap conference in October, 2001.

Picture a child with orthopedic impairments in a classroom.struggling to turn pages in a book.working hard to complete pencil and paper tasks.dictating to an adult aide—wishing he could do his work all by himself—independently.

Picture another child with low vision, struggling to complete a worksheet—laboring just to read her own handwriting.

Now picture these students proudly, happily, independently going about their work—without having to rely on others, using just one ubiquitous tool—a computer.

Is special software required to increase the independence of these children? Not necessarily. Not if you have access to Windows 98 and Microsoft Word 2000 (or the latest versions of these products: Windows XP and Word 2002)!

Educators are searching to find assistive technology options that are viable for students with a wide range of disabilities. Often, the options available are fairly expensive. At the annual "Closing the Gap" conference in October 2001, our workshop focused on utilizing standard Microsoft Word 2000 features and Windows 98 features to provide adaptations and increase our students' independence in school activities.

We use these programs for students with orthopedic impairments, visual impairments, and learning disabilities to customize computer access and increase student participation and efficiency in completing school-based tasks. The biggest advantage is the cost-efficiency of using software that is already on every computer in our school. We are able to utilize something that is readily available, which means that our students have access to what they need everywhere in the district. This software is also age-appropriate, utilized by most of their peers as well as adults, and teaches them skills that will be of even greater value as they get older. These tools are not just useful for students with special needs—but all students. The workshop at the conference focused on teaching professionals how to enhance student participation in the general education classroom by using technology that is already on most Windows-based computers.

Below are ideas that evolved from evaluating the needs of our students and attempting to use existing software to meet these needs. The use of these powerful tools is limited only by your creativity. In the following examples, we used Microsoft Windows 98 and Microsoft Office 2000 products.

Here are some ideas shared at the workshop:

- **Windows Accessibility Features**
  Accessibility features are available by default for computers running Microsoft Windows 98 and later versions of Windows (including Windows 2000, Windows Me, and Windows XP). These features make computer access far easier for individuals with disabilities. One accessibility utility—Microsoft Magnifier is used to enlarge what is viewed on the monitor. Font size, titles, menus, buttons, icons, scrollbars, mouse cursors, etc. can be adjusted for optimal viewing and efficient access. High-contrast options, captions with sounds/warnings, and special keyboard options are also available.
- **Form Filling Using Imaging for Windows 98**
  This feature allows the user to scan-in a document and mark annotations on it. We use this with students who have orthopedic impairments, so that they can scan in a worksheet, and use the annotation tools to complete their work independently. It allows the user to add, highlight, and underline text. There is also a rubber stamp feature, which enables the user to insert frequently used items such as name, date, subjects, etc. that might be used for every paper he/she types.
- **Keyboard Shortcuts**
  These increase efficiency and decrease the need for mouse access to commonly used buttons and icons. Internet Explorer shortcuts and Word shortcuts are covered in our workshop.
- **Creating Forms**
  Using the Forms toolbar in Microsoft Word 2000, you can create a form that can be used by a student to easily tab through the fields to complete a document. Text fields, check box fields, and drop-down lists (to specify choices for the user to select) can be inserted. It is possible to lock, or protect, the form so that it cannot be modified. This is a useful tool for setting up worksheets, tests, multiple-choice questions, letters, reports, etc. A number of general education teachers who have been shown this feature have started using it in their classrooms as well.
- **Creating Custom Ruled Paper**
  You can use the Tables and Borders toolbar in Microsoft Word 2000 to make ruled paper customized to the needs of specific students. The lines can be drawn in different colors and thicknesses, grids can be created to help with lining up numbers for math activities, and enlarged graph paper can be easily produced for students who need it. Samples of ruled paper that we have created are available to download from our Web site.
- **Using Print Screen**
  This feature enables the user to take "snapshots" of images as they appear on the computer monitor. We have used this to set up simple instructions for students

and staff members who are using new software. It is also useful for importing pictures into communication books/overlays.

- **Creating Clickable PowerPoint Lessons** For teachers who are always looking for interesting cause-and-effect software, and other software for teaching various skills, Microsoft PowerPoint 2000 and PowerPoint 2002 are very simple and effective means of creating computer activities. Graphics, sound, and animation can be added to make learning fun for students. Our students use these activities with a mouse, touch windows, trackballs, etc. The biggest advantage of this is that any activity created by teachers can be copied and shared with colleagues, parents, and others who can use them by saving the activity as a show. The 'Pack and Go' feature of this program also makes it easy to save the activity on a disk to use on a computer (perhaps in the student's house) that does not have PowerPoint installed on it. Older students who are learning to use PowerPoint in computer education classes can work on setting up activities on different topics for teachers to use in their classrooms.

Simple, clear, step-by-step instructions for these activities and more are available

Note: Some students may need additional hardware such as trackballs, touch windows, expanded keyboards, switches, and scanners to utilize the software listed above. For a list of assistive technology products compatible with these products, visit Microsoft's catalog of assistive technology products.

About the Authors: Subhashini Balagopal and Patti Young work together in Indiana at the Richmond Community Schools. Balagopal has over a decade of experience as a special educator working with students with orthopedic, visual, and multiple disabilities, including many with significant medical needs. Young has nine years experience in the area of special education. Both provide training for staff and students in assistive technology devices and software.