White Paper

Closing the Equity Gap:

Addressing NCLB Compliance with Access Infrastructure Software

Introduction

Districts have made significant investments in technology infrastructure across the last decade, achieving considerable improvements in student per computer ratios and the percentage of classrooms with internet access. In addition, the 2001 passage of the Elementary and Secondary Education Act, or "No Child Left Behind" Act, established a set of technology benchmarks and expectations for districts encouraging effective utilization of existing and new technology investments.

However, the expansion of districts' technology resources has resulted in a complex network of hardware and software applications that stretch the financial and human resources available to districts' IT staff. Districts today face challenges managing and maintaining their technology infrastructure, which adversely impacts the ability of administrators, educators, and students to access and utilize technology-based academic and administrative applications and information. To address these challenges, an increasing number of districts are investigating access infrastructure solutions to breathe new life into their heterogeneous computing networks.

INSIDE

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Access infrastructure software is an emerging enterprise software that provides users with secure, easy access to applications from anywhere, at any time, using nearly any device and over any connection. In this model, computing devices function as a gateway to centrally hosted applications and information; as long as teachers and students can access a network connection, they can tap into school resources. The expanded access provided by these software solutions directly addresses key elements of the No Child Left Behind Act.

This white paper details Chapel Hill-Carrboro City Schools' (CHCCS) and Franklin Township Public Schools' adoption and implementation of Citrix MetaFrame XP Presentation Server software and the thin-client computing environments powered by Citrix's solution. District administrators and other key decision makers gain insight into the factors driving CHCCS and Franklin Township to evaluate access infrastructure software and the benefits realized to date by both districts. The white paper also offers recommendations to districts and administrators investigating the adoption and implementation of Citrix MetaFrame XP Presentation Server.

Overview of "No Child Left Behind" Act

On January 8, 2002, President George W. Bush signed into law the reauthorization of the Elementary and Secondary Education Act (ESEA), also known as the "No Child Left Behind" (NCLB) Act of 2001. The law has galvanized K-12 stakeholders and consideration of NCLB permeates nearly every education conversation at local, state, and federal levels.

NCLB requires a transformation in the way that most schools and districts have traditionally approached their charter of educating students, developing teachers, and communicating with the broader community. While the various components of the legislation have received different levels of attention and focus, U.S. Department of Education officials view the "sweeping reform" program through the lens of four core principles:

- *Accountability* — Require states and districts to outline a plan for closing student achievement gaps and report progress toward targets/goals on an annual basis
- *Flexibility* — Provide the opportunity for schools to identify and implement solutions that reflect local needs and challenges
- *Research-based reforms* — Require schools to apply research- and evidence-based solutions to improve student performance and teacher quality
- *Parental options* — Establish alternative remediation and schooling options for parents whose children attend chronically underperforming schools

Within each of these areas, the federal legislation has identified practices and expectations to ensure alignment between districts' and schools' activities and the overarching legislative objectives (Table 1).

TABLE 1: NOTABLE NCLB MANDATES AND PROVISIONS

Principle	NCLB-Related Opportunity / Requirement
Accountability	• Test students in grades 3-8 each year in reading and math by the 2005-06 school year • Achieve adequate yearly progress (AYP) targets for schools, districts, and states • Track and report AYP performance for numerous student subgroups (e.g., racial and ethnic groups, economically disadvantaged students, students with disabilities) • Meet state-defined proficiency standards for all students by the 2013-14 school year
Flexibility	• Give states opportunities to pool federal funding resources and distribute them among key NCLB programs (e.g., Teacher Quality, Education Technology, Safe and Drug-Free Schools) as befits local needs
Research-based reforms	• Link funding (e.g., Reading First grants) to programs that have demonstrated effectiveness through "rigouous scientific research" • Encourage educators to evaluate relevant research prior to making instructional decisions
Parental options	• Provide clear and accessible reports of districts' and schools' academic performance vis-à-vis AYP targets • Create school choice options for parents whose children attend schools that fail to achieve academic improvement targets • Fund supplemental educational services for Title 1 students in under-performing schools

Since the signing of NCLB, administrators are using its mandates as a catalyst to drive innovation and re-evaluate traditional practices within schools and districts. This approach is particularly important, because even as schools and districts focus their energies on meeting NCLB regulations, they have had to also contend with contracting state education budgets. Despite the national prioritization of education, many state legislatures have been unable to exempt education from budget cuts. Twenty states reduced K-12 funding during fiscal year 2003; in many cases, these reductions were on top of mid-year 2002 cuts.

Leveraging Technology to Address NCLB Mandates

Administrators and educators are increasingly looking to capitalize on schools' existing technology resources to identify strategies for achieving academic and administrative requirements of the No Child Left Behind Act. Many administrators are employing technology solutions and strategies to create enhanced academic environments for students and introduce efficiencies into school activities and operations.

Moreover, as administrators evaluate technology solutions to assist their schools in meeting the academic and administrative requirements of NCLB, they need solutions that:

- Provide equal access to instructional tools and resources (e.g., reading and mathematics resources, word processing and other productivity applications, library and reference materials) to all students;
- Extend access to instructional tools and resources beyond the classroom to foster a continuous learning environment;
- Furnish educators and administrators with efficient access to critical administrative systems (e.g., student information system, human resources) and applications (e.g., gradebook, school schedule);
- Manage increasingly complex and heterogeneous computing environments with limited financial resources and a small staff of IT professionals; and
- Reduce the total cost of ownership of technology by extending the lifecycle of existing investments.[1]

Administrators must ensure that technology investment decisions have an impact on the fulfillment of NCLB-related objectives. Hardware and software purchases can no longer simply improve student-to-instructional computer ratios and provide new, supplemental classroom resources; technology investments must be applied as an effective lever to transform education delivery and infrastructure management, influence administrators' and teachers' decisionmaking, and create stronger links between home and school.

Access Infrastructure Model Supports NCLB Objectives and Addresses IT Management Challenges

Administrators at an increasing number of school districts are enhancing the performance and accessibility of their districts' technology infrastructure and services, while addressing the financial and human resource constraints facing IT staffs, by implementing access infrastructure software that allows for central management and deployment of applications; districts host core academic and administrative applications and resources on central servers, and computing devices with network connections become "access points" from which administrators, teachers, students, and parents can access these resources.

Within the NCLB legislation, the "Enhancing Education Through Technology" (Ed Tech) program represents the largest component explicitly targeting technology

[1] In 2003, the average educational technology state budget was cut by 25 percent according to research conducted by the State Educational Technology Directors Association. During the same period, federal educational technology funding remained steady through NCLB's "Enhancing Education Through Technology" program.

solutions and their use within K-12 schools. The Ed Tech program provides a well delineated set of opportunities for administrators seeking to apply technology-based tools and resources to NCLB's four core principles (i.e., accountability, flexibility, research-based reforms, parental options). In the near term, centrally hosted software applications and information accessible through network-connected computers influence schools' efforts in two critical areas:

- Enhancing access to and delivery of academic resources to students to facilitate performance improvement and achievement of AYP targets
- Improving administrators' and educators' ability to report, manage, and evaluate student data and information to drive decision-making

The access infrastructure model offers a platform for districts to address these mandates of NCLB. Moreover, access infrastructure software greatly reduces the costs associated with hardware and software maintenance and districts' overarching total cost of ownership for technology. IT professionals no longer have to spend hours and days installing software onto hundreds of individual computers; instead, software is installed on a server once and readily available to anyone across the school community with a network connection.

In addition, an older model computer can retain value over a longer period of time, as the computer shifts from a fully configured, multimedia device to a "thin-client" access point for centrally hosted resources. Districts also benefit from lower acquisition costs for new hardware, as they transition to an access infrastructure-enabled thin-client computing environment. In a thin-client computing environment, the vast majority of software applications available to end-users reside on centralized servers, not individual computers, and are accessible via network-connected computing devices.

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At Chapel Hill-Carrboro City Schools (CHCCS) and Franklin Township Public Schools, district administrators have used technology to expand access to core academic resources and information for teachers, students, administrators, and parents. Both districts have implemented access infrastructure software from Citrix, an industry-leading solution that enables access to centrally hosted applications. Their adoption of Citrix's solution has improved administrators', teachers', and students' access to key district-wide academic and administrative applications, while also improving the efficiency and value-add role of the districts' limited information technology staff. Senior administrators at CHCCS and Franklin Township stress that Citrix's solution enables an "always-on," cost-efficient technology environment that provides an important foundation for helping administrators, teachers, and students achieve NCLB accountability mandates.

Chapel Hill-Carrboro City Schools
Developing a Computing Environment Accessible to All Students

Background

The Chapel Hill-Carrboro City Schools (CHCCS) is one of two public school systems in Orange County, North Carolina and is located near the flagship campus of the University of North Carolina system and Research Triangle Park, an international hub for innovative and technology-intensive businesses and research organizations. The system has 16 schools — nine elementary schools, five middle schools, and two high schools — that support more than 10,500 students and approximately 1,800 administrators, teachers, and staff.

Arriving at a Solution

The Chapel Hill-Carrboro City Schools completed a system-wide technology plan during the 2000-2001 academic year and a system-wide strategic plan the following academic year. Two key elements of these planning activities included strengthening the effectiveness and efficiency of CHCCS' technology environment and ensuring "equity and excellence for all students." According to Ray Reitz, chief technology officer at CHCCS, the former issue required the system to find technology infrastructure solutions that were "simple, reliable, supportable, and affordable"; the latter issue emphasized providing all students with access to computing tools and resources.

Because of the diverse student population comprising CHCCS, managing equity issues had been a key issue for system administrators well before passage of the "No Child Left Behind" (NCLB) Act. For example, since 2000, CHCCS has striven to provide equal access to computing solutions to students in school, while also advocating for a program that would provide computer and internet access to students at home. As CHCCS grappled with opportunities for addressing equity issues, as well as with strategies driving more effective management of its technology environment, Reitz and his colleagues investigated access infrastructure solutions from Citrix and thin-client computing solutions.

CHCCS piloted Citrix MetaFrame Presentation Server software and thin-client computers in one middle school during 2000-2001, and Reitz notes the pilot was "extremely successful." Subsequently, CHCCS implemented Citrix's solution in a newly opened middle school in 2001-2002 that has an entirely thin-client computing model, as well as in the system's two high schools, remaining three middle schools, and two of the elementary schools. The centralized hosting and deployment of key district software (e.g., typing tutors, reading and math applications, word processing, PowerPoint) and internet connectivity facilitated by

Citrix have enhanced students' and teachers' access to technology resources and mitigated many of the complexities of managing a computer network composed of numerous different clients and operating systems.

Leading Issues Driving Solution Adoption at Chapel Hill-Carrboro City Schools

Chapel Hill-Carrboro City Schools' decision to implement Citrix's solution and adopt a thin-client computing model aligned closely with key strategic objectives outlined by district leaders. Moreover, while CHCCS' efforts pre-dated the passage of NCLB, administrators have found that they have been able to accelerate their ability to address key elements of the federal legislation based on their technology initiatives.

Streamlining the System's Technology Infrastructure

Similar to most school districts across the country, Chapel Hill-Carrboro City Schools found itself with an unsupportable computer infrastructure by the end of the 1990s. During the 1980s, the prevailing theme of school computing solutions was PC computing (i.e., desktop computers in classrooms and computer labs), while in the 1990s, administrators' efforts had focused on establishing networked environments (i.e., local area networks/LANs, wide area networks/WANs). For CHCCS, these school computing trends had left the district with buildings that had as many as 30 different types of client devices running 10-15 different operating systems.

Eliminating CHCCS' diverse computing environment was a key output of the technology and strategic planning processes. CHCCS did not have sufficient staff to manage the complex network of clients and operating systems that had evolved; Reitz's mandate was to find solutions that were "simple, reliable, supportable, and affordable." By implementing Citrix's solution and transitioning schools to a thin-client computing model, CHCCS has made great strides in simplifying management of the system's computer network without expanding staffing, while also breathing new life into older computers that have been converted into effective thin-client access points.

Delivering Equal Access and Extending School Resources to Home

CHCCS administrators wanted to abide by the concept that learning does not end when students leave school and sought to extend access to school tools and resources to students at home. The adoption of Citrix's solution enables middle school and high school students to access school applications and personal work from an internet-connected computer outside of school. Reitz notes that now, students log off school computers at the end of the day and 30 minutes later, after getting home, log back on to work on school projects and other activities. Moreover, Reitz reports that students are also "teaching themselves"; a sixth-grade student developed a

multimedia PowerPoint presentation at home for a school project only two days after receiving the orientation on how to log in from home.

In addition, CHCCS serves a diverse population — nearly 40 percent of the students represent ethnic minorities. Research conducted by the system indicates that approximately 12 percent of CHCCS students, or roughly 1,200 students, do not have a computer at home. However, with the adoption of the access infrastructure environment enabled by Citrix, CHCCS students can access school resources from any internet-connected computer; as a result, CHCCS has launched an innovative program called "Connect 2 School" that provides thin-client computers to students and families that do not have computers at home to ensure equitable access to school and computing resources.[2]

Importantly, Reitz stresses that Connect 2 School is not simply a progressive technology program, but also a critical community outreach program that aims to bridge the digital divide in many communities and ensure that students and family members are developing 21st century learning and technology literacy skills. CHCCS has secured both federal Enhancing Education Through Technology grants and corporate foundation grants to purchase low-cost thin-client devices for students and to support a program manager position in the district. From the time that students first request participation in the program, it takes, on average, only two weeks for the district to help students to secure a thin-client computer and internet connection through a local ISP. To date, nearly 100 students and their families have received computers through this initiative, enhancing students' access to technology and academic resources outside the traditional school environment.

Supporting Improved Student Performance and No Child Left Behind Mandates

CHCCS' adoption of an access infrastructure environment and its innovative Connect 2 School program served as an excellent foundation for assisting CHCCS in achieving key tenets of the federal legislation.

- Annual Yearly Progress (AYP) targets — Research in progress by the HomeNetToo Project at Michigan State University indicates that low-income students with a computer at home spent more time reading and scored higher on standardized tests than those students without a computer.[3] CHCCS administrators anticipate that one benefit from the Connect 2 School program will be improvements in students' reading skills and performance on reading assessments tied to AYP targets.

[2] More information regarding CHCCS' Connect 2 School initiative can be found at http://www.chccs.k12.nc.us/t+l/accessforall.asp.

[3] The HomeNetToo Project is a research project funded by the National Science Foundation to investigate internet use in the homes of low-income families. More information can be found at http://www.homenettoo.org.

- Technology literacy — NCLB highlights targets for improving students' technology literacy and for integrating technology resources into the curriculum. Reitz notes that the lower cost of managing and maintaining thin-client computing devices enables a more ubiquitous computing environment, facilitating greater integration and use of technology in daily classroom activities. Students are spending more time on computers to research information, sort data with software tools and web-based resources, and complete projects and activities.

Benefits

Chapel Hill-Carrboro City Schools has experienced several benefits from its implementation of Citrix MetaFrame XP Presentation Server and the thin-client computing environment established.

- *Enhancing access to system-wide resources* — CHCCS has established a technology infrastructure that provides students, educators, and administrators with more flexible and convenient access to academic and administrative resources. The access infrastructure environment allows students to do "100 percent of what they would do in school," according to Reitz, regardless of the computing device they are using and/or the location from which they access the resources. For example, in addition to the Connect 2 School initiative, CHCCS has also secured grants to place thin-client devices in public housing community centers for use by students and families.

  Similarly, teachers have access to student work, as well as key productivity and administrative tools (e.g., email, gradebook, media center resources), regardless of their location; moreover, CHCCS educators and administrators also have access to North Carolina's statewide student information system, called "NC Wise."

- *Improved classroom teaching environment* — CHCCS teachers report that software applications loaded on Citrix MetaFrame XP Presentation Server boot in seconds, rather than the minutes often required in the former PC computing environment. Students spend more "time on task" and less time waiting for computer issues to be resolved, according to teachers. In addition, teachers have noted a decrease in student misbehavior as a result of "down time" associated with using computers in the classroom.

- *More manageable technology environment* — Reitz stresses that Citrix's solution is helping CHCCS achieve its objectives by establishing a more "simple, reliable, supportable, and affordable" computing environment. Information technology managers, as well as administrators and teachers, now have a simpler, more user-friendly computing environment without many of the

hassles inherent in a networked PC model. New software is installed once on a central server, rather than dozens or hundreds of times on individual clients.

In addition, the central management of software applications and the stability of "industrial strength servers" have created a more reliable technology environment. This factor is a critical one for teachers, who desire reliable solutions as a pre-condition for integrating technology tools and resources into their classroom activities and curriculum.

- *Lower total cost of ownership* — CHCCS has considerably extended its computing environment at a fraction of the cost required in a networked PC model. By investing in Citrix's industry-standard solution, CHCCS has improved the scale and efficiency of its technology infrastructure without incurring the cost of hiring additional staff. CHCCS can set up new computers at less than $500 per device, has achieved more than 50 percent savings in maintenance costs, and has extended the life of old Mac and PC computers.

Moreover, Reitz acknowledges that NCLB has had a positive impact on CHCCS' technology efforts. The federal legislation has served as a catalyzing issue within the community, building support for the system's technology initiatives, especially Connect 2 School, across a range of stakeholders. In addition, CHCCS is in the process of identifying and implementing data collection strategies to evaluate the effectiveness of its technology initiatives and report on the benefits gained through these investments.

Lessons Learned

CHCCS has leveraged Citrix's MetraFrame XP Presentation Server solution to drive greater value from its technology investments at a time when schools are expected to deliver more to students, even as the resources available to do so have declined. Reitz highlights several issues for districts and administrators to address when evaluating and adopting Citrix's access infrastructure solution and a thin-client computing model.

- *Select an experienced Citrix solutions partner to drive successful implementation* — Reitz stresses that schools should not attempt to implement Citrix products by themselves. Most districts do not have sufficient resources or experience to manage this process. Districts should partner with a certified Citrix solution provide that can facilitate an effective implementation and deployment and educate district IT staff regarding key ongoing management and maintenance issues.
- *Cultivate realistic expectations across the school community* — IT staff need to communicate effectively to administrators, teachers, and students regarding the opportunities provided by and limitations of Citrix's solution. Failure to

educate users can create a "trust issue" that may hinder adoption and acceptance of the solution. Reitz stresses that clearly communicating the benefits of the new computing environment, while also acknowledging the changes, is important for building user support.

- *Manage the "human" issues as much as the technology ones* — Reitz believes that Citrix provides an effective solution for helping schools create more equitable access to technology across different schools and for students within the community, regardless of their level of resources. However, implementing the technology solution is only one step in the process. CHCCS has found that educating and managing people impacted by the solution is even more important, including planning and developing outreach programs and supporting individual efforts to integrate newly available technology resources.

Chapel Hill-Carrboro City Schools has employed Citrix's solution to create a robust thin-client computing environment that directly addresses the challenges posed by students' lack of access to fundamental technology tools and resources. The system's technology initiatives are creating equitable access to computers for all students and laying a foundation for addressing the more critical academic performance issues at the heart of the No Child Left Behind Act.

Franklin Township Public Schools
Expanding Access To School-Based Software Applications And Resources

Background

The Franklin Township Public School district is located in Somerset County, New Jersey — midway between New York City and Philadelphia — and serves a population base of more than 45,000 residents. The township has six elementary magnet schools, one middle school, and one high school to support approximately 4,500 students and 500 administrators, teachers, and staff.

Arriving at a Solution

In the summer of 2001, the Franklin Township Board of Education proposed placing a computing device in every K-6 classroom and approached the district's network administrator, Andrew Knechel, to evaluate the proposal. Knechel realized that his information technology (IT) group would need two additional staff members to manage the approximately 400 new computers and the multitude of applications located on the individual computers, but the Board did not have the resources for additional staff hires.

During this time, Debra Sheard, director of social studies and technology education, attended a presentation highlighting access infrastructure solutions and recognized that this computing model had the potential to mitigate the staffing challenges that Knechel foresaw with 400 additional computers. The Township evaluated, and ultimately purchased, Citrix's MetaFrame XP Presentation Server, which facilitates a thin-client computing environment that maximizes access to critical software applications while minimizing the management and maintenance of individual computing devices.

Franklin Township completed the Citrix MetaFrame XP Presentation Server implementation for the district's K-6 schools during the 2001-2002 academic year. Franklin Township applied key lessons learned during this first phase of the implementation cycle during the summer of 2002, when it completed the middle school and high school implementation. Therefore, Franklin Township finds itself entering the second full year of its Citrix implementation in the fall of 2003.

Leading Issues Driving Solution Adoption at Franklin Township School District

Franklin Township's initial impetus for implementing Citrix's solution was to effectively manage the system's expanded technology infrastructure. However, administrators and educators quickly recognized the value of the Citrix solution in helping the Township make progress toward fulfilling expectations included in the No Child Left Behind Act.

Enhancing Students' Access to Academic Resources from Home

Franklin Township's initial goal in implementing an access infrastructure solution was to provide students with the ability to access school applications outside of the school environment. Currently, all students at the Franklin Township Public Schools can access school projects and personal data from home from any computer with internet access, regardless of make and model. Knechel reports that district parents have responded enthusiastically to their children's enhanced access to school applications and resources enabled by Citrix's solution.

Improving Data Management and Analysis Strategies

Moreover, once Citrix MetaFrame XP Presentation Server was deployed, school officials recognized that the solution would influence and support some of the Township's objectives in meeting requirements articulated by NCLB. Districts' and educators' effective use of school and student data to drive decision making is a key theme running through the NCLB legislation; for Franklin Township administrators and educators, accurate and timely capture of critical performance data has been an ongoing challenge.

Historically, Franklin Township's network administrators coordinated a computing environment in which each desktop computer had relevant applications on the hard drive; each unit had to be individually maintained and updated by district IT staff when new software and upgrades were released. This situation created time-consuming management tasks for IT staff and a computing environment operating at a less than optimum level for administrators and educators. In many cases, computer "down time" and related problems prevented administrators and educators from entering data into key district-wide applications.

Franklin Township administrators faced two additional issues in improving their data management activities:

- Many teachers perform key data activities (e.g., grading and scoring) outside school
- Some of the district's classrooms did not have computers and/or relevant applications to facilitate data capture

Within this context, Franklin Township officials anticipated potential challenges in complying with some of the reporting requirements of NCLB. However, deployment of Citrix's solution has dramatically reduced the hardware and software management challenges faced by the district's IT staff and enhanced administrators' and educators' ability to report and review critical data on students and their performance. Similar to the access benefits recognized by students, administrators and educators can now access district administrative applications and resources from remote locations and from any internet-enabled device.

Benefits

Franklin Township Public Schools has witnessed several significant benefits from Citrix MetaFrame XP Presentation Server in only its second full year of implementation.

- *Improved access to district applications* — Franklin Township has established an on-demand access environment for the district's students, administrators, and educators, who can now access core district applications outside school from any device. The township is transforming the notion that school activities must occur exclusively within the four walls of the school buildings.
- *Enhanced data management and analysis* — Administrators and educators can now manage and evaluate key performance data more effectively, no longer constrained by applications on classroom-based computers. Franklin Township has installed its suite of Pearson Educational Technologies' student information applications on Citrix, providing administrators and educators with enhanced access to student information, including attendance, grades, and historical performance.
- *Greater emphasis on value-add role of IT staff* — Knechel reports that the roles and responsibilities of the IT staff have shifted considerably following the deployment of Citrix. IT staff had traditionally spent 75 percent of their time fixing computers and the remainder providing training to district personnel. Today, those percentages are flipped. The technology support staff concentrate on delivering training (i.e., approximately 75 percent of time) to district administrators and educators to help them maximize use of the district's hardware and software resources to achieve academic objectives; this professional services approach is in sharp contrast to the previous role played by the IT staff.
- *Lower total cost of ownership* — The management and maintenance of an access infrastructure and thin-client computing environment have helped the district reduce costs by up to 75 percent, according to Knechel. Franklin Township can now roll out software applications in a matter of hours on centralized servers, rather than in the four to five weeks traditionally required to install applications on thousands of individual computers. In addition, any subsequent software upgrades are confined to the central servers and immediately available to the hundreds of users throughout the district. Moreover, a small technology support staff can manage and maintain a far greater number of computers (e.g., 1 IT staff member/50 computers in a traditional computing environment as compared to 1 IT staff member/ 1,000 devices in a thin-client environment).

Moving forward, Knechel stresses that the Township's Citrix implementation will play a significant role in facilitating the roll out and delivery of academic resources and applications to address student performance gaps. Any new NCLB-related applications or resources considered by the Township will need to run on the Citrix MetaFrame XP Presentation Server, ensuring broad availability to administrators, teachers, and students.

Lessons Learned

Knechel stresses that applying technology applications and resources to address academic objectives and NCLB mandates requires drawing clear distinctions as to the role and impact of technology on student performance. Knechel highlights several key issues for districts and educators to consider as they prepare to implement Citrix MetaFrame XP Presentation Server solution.

- *Focus on academic solutions, not technology ones* — Districts need to communicate and demonstrate how technology investments will drive academic improvements; technology resources are tools, similar to pencils, paper, and textbooks, employed to create a richer learning environment, and Knechel stresses highlighting this theme before the institution begins evaluating hardware and software solutions. Administrators, educators, and parents should view technology as a catalyst for achieving a well-defined and articulated academic objective.
- *Communicate expectations across stakeholder community* — Citrix's solution creates a significant change in users' computing environment, as the thin-client model shifts control of software applications from an individual's desktop to the school or district server. This shift reduces educators' flexibility and autonomy regarding desktop software decisions; district administrators and IT staff need to effectively communicate these changes to educators in advance, set expectations, and highlight the benefits gained in a thin-client computing environment.
- *Conduct a 90-day pilot program and evaluation of the solution* — Knechel stresses the importance of conducting a 90-day pilot program prior to full implementation of Citrix's solution to identify potential challenges and issues in transitioning administrative and academic applications to a centrally hosted server environment. Knechel reports that some software applications may not work optimally in a thin-client environment; IT staff and educators can use the pilot program to determine alternative strategies to make important academic software resources available and minimize surprises following broader solution roll out.

At Franklin Township, the technology implementation process emphasizes the key change management activities that facilitate administrators', educators', and staff members' adoption and effective use of new tools and resources. With the successful implementation of Citrix's solution across the district, Franklin Township is now focused on the more critical end goal - expanding educators' and students' access to academic and data management resources to enhance student performance.

Conclusion

The "No Child Left Behind" Act places strict accountability expectations on districts, but the legislation, and its impact on schools, must be viewed as more than simply an emphasis on improved test scores. Rather, NCLB serves as a catalyst for change in districts, encouraging administrators and educators to re-envision academic and administrative processes to achieve academic objectives.

Currently, the most critical change management efforts lie in implementing new strategies and resources for:

- Capturing and tracking student data, and
- Expanding administrators', educators', and students' access to computing devices and instructional applications.

These two components of NCLB - managing data and expanding access - are the foundation on which administrators and educators are driving change in their educational communities. Districts must possess a consistent base of data and resources (i.e., "inputs") for all students to facilitate attainment of the academic performance targets (i.e., "outputs") outlined in NCLB.

The K-12 market has witnessed numerous technology innovations in the last decade, and many districts feel overwhelmed by the pace of technological change. For administrators, sifting through the plethora of "new solutions" can prove daunting; for technology vendors, articulating the value proposition of their offerings often feels equally challenging. In today's current environment, with both groups facing heightened performance expectations imposed by NCLB, selecting technologies that facilitate compliance is imperative.

Access infrastructure software can assist districts and schools in addressing the organizational changes inspired by NCLB, as demonstrated by the experiences of Chapel Hill-Carrboro City Schools and Franklin Township Public Schools. Access infrastructure software is an enabling technology that allows schools to develop a common computing environment, enhancing data management efforts and access to instructional technology resources.

In this new computing environment, schools achieve meaningful NCLB-related benefits. Student learning continues beyond the walls of the school buildings, as students and parents access academic resources and information from any internet-connected computer. Administrators and educators can access critical school data and student work remotely, as well. Network management and maintenance costs decline, even as the number of district computing devices increases. Ultimately, it is

an environment in which the location of school-based resources matters less than the location of the individual user and his or her access to an internet-connected computing device.

As “No Child Left Behind” places new pressures on districts, administrators and educators must demonstrate a willingness to change. In this environment, achieving the academic and operational benefits from the array of technology resources that schools have accumulated is imperative; access infrastructure software provides a key strategic resource that can enable schools to fulfill these objectives.

Appendix A: Overview of "Enhancing Education Through Technology" Program.

The "Enhancing Education Through Technology" (Ed Tech) program is Title II, Part D of the legislation, and the federal government's fiscal year 2003 program appropriations reached nearly $700 million. Ed Tech funding is distributed to state education agencies (SEAs), with at least 95 percent of each state's allocation distributed to eligible local education agencies (LEAs) by formula and through competitive application programs.

The primary goal of the Ed Tech program is "to improve student academic achievement through the use of technology in schools." Secondary objectives include ensuring that all students are technology literate by the end of eighth grade and integrating technology with teacher training and curriculum development efforts to facilitate effective, research-based classroom practices. LEAs may apply Ed Tech funds to a broad range of activities in support of these objectives, including:

- Increasing accessibility to technology, with an emphasis on supporting high-need schools;
- Adapting or expanding applications of technology to facilitate teachers' efforts to increase student academic achievement;
- Implementing courses and curricula that include integrated technology and that are designed to help students reach challenging academic standards;
- Using technology to promote parental involvement and foster enhanced communication among students, parents, and teachers;
- Enhancing existing technology infrastructure and resources and acquiring new technology to support education reforms and to improve student achievement;
- Acquiring connectivity linkages, resources, and services for use by students and school personnel to improve academic achievement; and
- Using technology to collect, manage, and analyze data to inform and enhance teaching and school improvement efforts.

Appendix B: Additional Resources

"Access for All: Providing Home-School Connectivity," Chapel Hill-Carrboro City Schools, October 2003.
http://www.chccs.k12.nc.us/t+l/accessforall.asp

Bellingham School District case study
http://www.citrix.com/site/aboutCitrix/caseStudies/caseStudy.asp?storyID=7111

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http://www.ed.gov/programs/edtech/index.html

Knechel, Andrew. Franklin Township Public Schools presentation, October 2003.

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http://www.msu.edu/user/jackso67/homenettoo/

"State Budget Survey," State Educational Technology Directors Association, November 2003.
http://www.setda.org/

No Child Left Behind informational website, U.S. Department of Education.
http://www.ed.gov/nclb/landing.jhtml?src=pb

The No Child Left Behind Act of 2001, U.S. Department of Education, 2003.
http://www.ed.gov/policy/elsec/leg/esea02/index.html

Washington School Information Processing Cooperative case study
http://www.citrix.com/site/aboutCitrix/caseStudies/caseStudy.asp?storyID=10116

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Closing the Equity Gap:
Addressing NCLB Compliance with Access Infrastructure Software

By Adam Newman, Vice President of Research

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