
Findings from NC Education Cloud Interview and Survey Process

A Report on Local Capacity to
Plan, Implement, Sustain,
and Evaluate Large-scale
Technology Initiatives

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Introduction

On the surface, both the NC Education Cloud (NCEdCloud) and the Instructional Improvement System (IIS) seem to be large technology initiatives. While technology is certainly a large part of this work, the real goal is to enable personalized learning for North Carolina's public K-12 students' and individualized learning for our teachers' professional growth.

The focus of the NCEdCloud work is to provide "behind the curtain" shared services – shared learning infrastructure, shared enterprise infrastructure, and modernized business systems – that remove the redundancy of doing these projects in 115 LEAs and 100+ charter schools. As these shared services are utilized in schools and districts across the state, existing technology support structures can be transitioned to supporting technology that directly affects learning. Likewise, the IIS will incorporate some of these NCEdCloud services, as well as additional tools, into an online system that will truly support teaching and learning by providing up-to-date data and digital learning toolkits to students, educators, and administrators to support individualized, data-driven instruction.

As work began on the NCEdCloud, the Cloud leadership team felt it was important to meet with LEA and charter school leadership to gather information on district/school technology use, upcoming initiatives, difficulties in implementing and sustaining local technology initiatives, budgeting information, and concerns about moving systems and service to the cloud. The team conducted site interviews and technology systems inventories (in the form of a 300+ question survey). While the survey data has been important to prioritizing services that will be offered in the NCEdCloud, the interviews – ranging from two to six hours in length, held with 114 LEAs and 10 charter schools, with participants that included some mixture of CTOs/technology directors, superintendents, assistant and associate superintendents, chief financial officers, and classroom practitioners – have served a broader purpose. Information from these meetings paint a picture of how our schools might be able to move forward with technology-enabled instruction, and adopt statewide services like the NCEdCloud and IIS.

Capacity, Sustainability, and Leadership of LEA Technology and Technology-enabled Initiatives

The following emerged from the interviews:

- Leadership is key to success;
- Common vision across the district;
- Lack of evaluation and vetting of Integrated Learning Management software;
- Purchases are often not made with sustainability as a key decision point;
- Prioritization of funding and sources; and,
- “What districts and schools are using” versus “How they are using it.”

21st Century Leadership

As with all organizational and most educational endeavors, good leadership is the key to success. For LEA initiatives to be successful, LEA superintendents must truly understand how to develop strategic plans that support the transformation to technology-enabled teaching and learning. This planning process must incorporate the instructional goals of the LEA, involve all stakeholders (including parents and other community members), and reflect that technology is an important tool. Also, the plan development must consider sustainability efforts early in the process. In the LEAs with the most successful technology-rich initiatives, leaders at the district and school levels share the same vision and work together to make the decisions.

Moreover, strong transformative district leaders recognize that ubiquitous access to technology tools is a critical factor in truly using data to individualize instruction. As this realization becomes more common among leaders in our state’s LEAs and schools, some have already taken the initiative to procure and build systems and platforms to dive into easy and up-to-date classroom and schools data. Because of invested resources and personnel, these districts may be reluctant to take wholesale advantage of the offerings in both the IIS and the NCEdCloud.

At the LEA Chief Technology Officer (CTO)/technology director/technology coordinator levels, those leaders who have been licensed educators tend to have a better record in assuring that technology is seen as supporting instruction, not driving it. Technology leadership that understands pedagogy and instruction generally results in an LEA that has successful technology-enabled instructional initiatives. Furthermore, in many cases, LEAs that have technology leadership that reports directly to district curriculum and instruction leadership seem to have a more clear-cut expectation of how teachers should use technology to support instructional goals. In all LEAs that have highly successful technology-enabled instructional initiatives, the highest-ranking technology personnel are considered a part of the core district leadership team. In LEAs with a common focus, there is clear evidence of leadership at many levels.

Funding and Sustainability

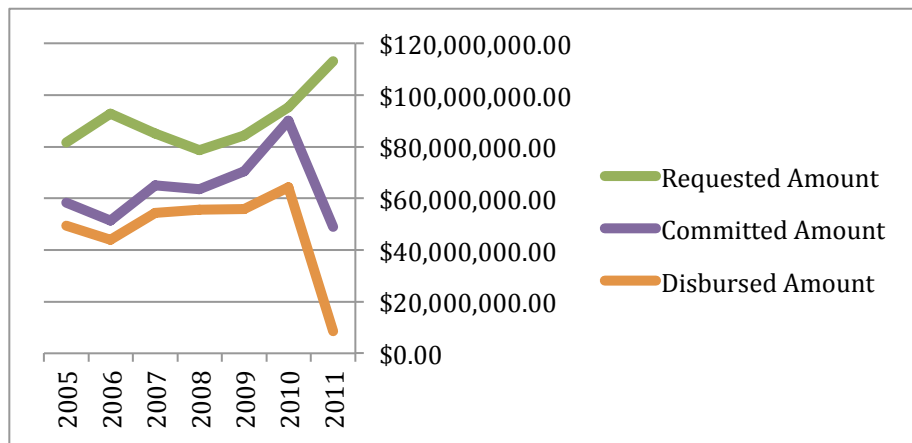
While funding is a challenge for all North Carolina schools, funding for technology is especially difficult and fragmented. In many cases, LEA technology directors have no involvement in planning efforts and spending local, state, and federal funds, even when these funds are earmarked for technology purchases. Because of the decrease in state and federal technology funds, and the lack of understanding of the potential for using technology in instruction, technology is not being deployed and used consistently across the state.

Shared services, a critical NCEdCloud concept, are a path to effectiveness, efficiency, and cost redirection. Currently, with the exception of the WRESA’s WNC-EdNet, there is little evidence that districts are regionally forming consortiums to use their buying power to procure shared services. On the opposite end of the spectrum, many individual LEAs are spending large amounts of RttT funding on technology infrastructure, including student and teacher hardware deployment. Based upon this, the NCPDI and the NCSU Friday Institute for Educational Innovation are engaged in a partnership to scale the North Carolina Learning Technology Initiative Framework for technology-enable learning implementations. This initiative emphasizes regional support to assist LEAs in strategic planning, sustainability, professional development, and implementation efforts.

Across the state, millions of dollars are spent annually on assessment resources and integrated learning systems. Providing best-of-breed alternatives to these LEA resources in the IIS will enable the LEAs to reallocate existing funding to help sustain the initiative.

E-Rate provides millions of dollars for technology funding and reimbursement in North Carolina. However, some LEAs that are eligible for this funding do not choose to apply. Others choose to use outside consultants to file their E-Rate applications. These overhead fees result in less funding to the LEA. While almost every LEA leader expresses an interest in using 21st century, collaborative, “Web 2.0” technologies in the classrooms, many technology directors and/or superintendents seem overly

conservative in allowing these types of sites to go unfiltered. The Child Internet Protection Act (CIPA) is legislation that governs internet usage in North



Carolina's schools. However, federal guidelines and policies are vague and local implementation is inconsistent across our state.

Technology Governance, Portfolio Management, and Focus

The old adage “less is more” seems to hold true for LEAs and charter schools deploying successful technology-enabled initiatives. In the LEAs that utilize technology most effectively, leadership chooses to focus **only** on those various processes and initiatives that support effective use of technology. Instead of deploying the typical dozens of software packages and services, leadership makes a concerted effort to only utilize those packages that align directly with the instructional vision of the district and that clearly affect student achievement. These districts have developed time- and data-tested processes for determining “best of class” products, services and policies that only support what has been locally deemed a high priority. In other districts, where technology use in the schools and classrooms has not realized potential, district technology departments are hobbled because they try to support too many software titles, online tools, and assessment-related services.

Some poor site-based decision-making can be attributed to a lack of portfolio management. Typically, NCEdCloud surveys, conversations and interviews revealed that in schools and districts where site-based decisions were effective, there were coordinated across all levels of leadership (LEA and building).

Professional Development: Integral to Success, Difficult to Sustain

The majority of the LEAs and charter schools express concerns about supporting and providing sufficient professional development for both the NCEdCloud Initiative and the IIS. Likewise, general professional development needs for local technology-enabled instructional initiatives are frequently cited as a concern. As funds to provide for instructional technology support positions in the LEAs and schools have been eliminated, most districts struggle to support changes in the way technology is being utilized in classrooms or centrally. While some may assume teachers recently graduating from colleges of education would not need professional development in using technology in the classroom, this is not often the case. Most technology directors and instructional leadership, when asked, responded that newer generations of teachers are more technology proficient with respect to personal use, but still are ineffective in using technology as a classroom tool or integrating technology into instructional and student learning practices. Similarly, most leadership cites a lack of the ability to evaluate true technology among employees. As noted earlier, districts that have chosen online tools, platforms, and resources that have an intuitive K-12 user interface experience have earlier and more success in integrating these tools at the classroom level. The decision to choose these classroom-friendly tools—like Haiku, Edmodo, and Gaggle—create fewer professional development needs and encourage sustainability.

Strong Instructional Technology Facilitators are Critical to Success

Since 2008, the Friday Institute for Educational Innovation in the College of Education at NC State University has conducted several evaluations for the NCDPI on federal, state, and locally funded school-level technology-enabled instructional initiatives in. Instructional Technology Facilitators played a significant role in the success of technology integration into classroom practices. The technology facilitators were almost universally described as an integral part of the changing instructional practice and critical to the success of the instructional initiative. LEA leadership acknowledges this. Throughout interviews, the need for state-funded instructional technology facilitator positions was cited as a critical need for sustained success.

Instructional Functionality (findings related to adoption of the NC Instructional Improvement System)

The following emerged from the interviews:

- Classroom management tools and platforms;
- Current online assessment landscape; and,
- Effective data usage.

Interface/Usability

Highly successful LEAs understand how to plan, implement, and sustain technology-enabled instructional initiatives. In these districts, administrators, teachers, and students find that teaching and learning could not be fully realized without the technology. Most of these successful LEAs use a Learner Management System (LMS)/Content Management System (CMS) to deliver content and learning. The LMS/CMS becomes an integral classroom management tool, not just a tool for delivering online instruction. Also, LEAs that are most successful in using technology as an integral tool (Mooresville, Surry, Chapel Hill-Carrboro City Schools) use systems that are designed specifically for K-12 use (Gaggle, eChalk, Haiku, Angel). For most large technology-enabled initiatives (ie. 1:1 laptop programs) that are achieving the instructional goals district and school teams have set, an LMS/CMS is the “glue” that connects the technology with instruction. Furthermore, in these highly successful LEAs, teachers understand how these technologies make their jobs easier.

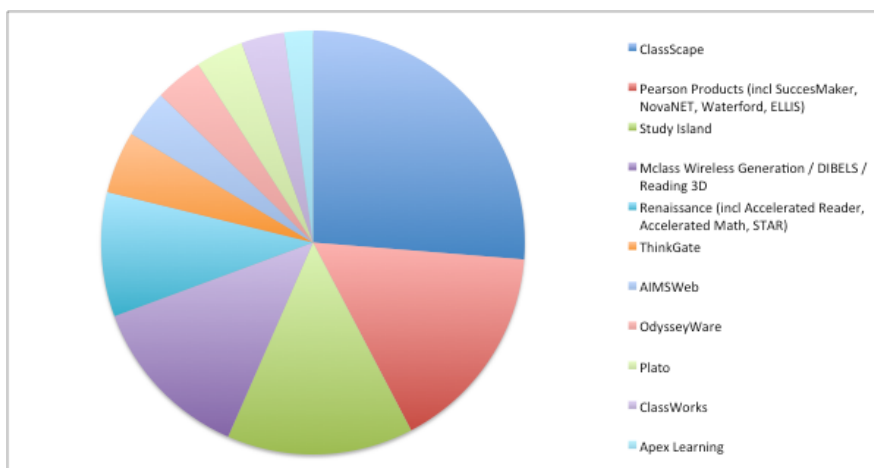
Culture of Online Assessments

Many online assessment tools are being used in the LEAs and charters across the state. The majority of schools and LEAs using online assessment tools use ClassScape. Most technology directors cite ClassScape as a low-cost solution that is the most closely aligned with North Carolina’s curriculum standards. However, many technology directors cite reliability, performance, and technical support issues with ClassScape, but the low cost of the product entices many districts to

keep subscribing and using it. In aggregate, our interviews indicate that LEAs are confident that NCSU Technical Outreach for Public Schools can provide quality content, but are concerned with the reliability and support of the interim and summative assessment products.

Many district leaders were impressed with the content and the feature set of the ThinkGate Elements assessment tool. While widely used in CTE courses, cost has prohibited it from being adopted for other curricular areas.

Similarly, LEA leadership was generally positive about the Wireless Generation mCLASS diagnostics platform. The



usability of the product, as well as the timeliness of real-time, teacher-consumable data, combined to make it a valuable classroom tool. Concerns regarding sustainability of the state sites, the high costs of deploying in non-state funded sites, and the choice of state hardware, however, surfaced in interviews and surveys.

A surprising number of LEAs still choose to use ScanTron tools to administer traditional paper-and-pencil assessments.

Data (warehousing, operational data store, use of NC WISE)

The overall landscape of data use as an instructional tool can be categorized into three scenarios: limited or no use of data, manual “human-powered” aggregation and analysis, and LEA-provided data warehouses (which is typically overly-complex and very costly). Use of individualized, disaggregated data is still considered the “holy grail” of using data to inform instruction. However, due to the platforms and services in place at the LEA and state levels, access to real-time data is difficult. Most districts indicate that teachers in their schools use NC WISE primarily as an interim- and final-marks collection tool. This use case does not provide real-time data to make instructional decisions. The lack of an operational data store at either the local or state levels also make using data to inform instruction difficult. Interoperability between data and disparate systems also make true data use costly and difficult. Many LEA leaders also cite lack of sustainable professional development as an impediment to effectively using classroom data.

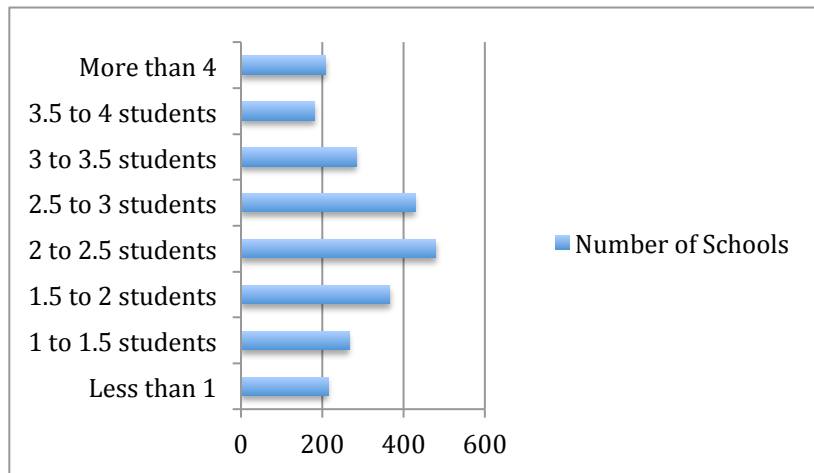
Information Technology Functionality (findings related to adoption of the NC Education Cloud)

The following emerged from the interviews and survey data:

- Infrastructure and client device obsolescence;
- Disparate requirements for teaching and learning hardware, e.g. screen resolution, browser capabilities and standards, need for plug-ins; tech support;
- Access and online assessment readiness;
- Connectivity at school versus connectivity at home;
- Obsolescence of business support platforms and tools;
- Lack of directories and ability to use identity as a unified tool; and,
- Current status of cloud computing.

Student Access to End-User Devices and Technical Support

LEAs are struggling to reconcile the current end-user device environment where technical obsolescence is a significant challenge, especially with device options (refurbished devices, Bring Your Own Device (BYOD), tablets versus laptops) and application requirements, most notably online assessments. Where learning management systems are in use or being considered, their effectiveness is often limited by student access to end-user devices.



Content creation versus content consumption is often identified as a concern when comparing tablets, laptops, and handheld devices (e.g. smartphones).

LEAs are replacing, or complementing their computing labs with mobile computing (laptops or tablets) carts or 1:1 initiatives. Apple iOS devices like the iPad are being deployed in greater numbers across the state. The majority of North Carolina’s LEAs have begun large-scale technology-enabled pilots or initiatives; however, there is significant concern regarding the ability to support and financially sustain these implementations. In addition to funding these initiatives through traditional means,

LEAs are exploring alternative funding strategies, e.g. establishing a nonprofit trust or leveraging E-Rate for bundled services (device plus 3G/4G access), or technology strategies like BYOD and virtual desktop.

Bring Your Own Device: Supporting Personal Devices on the LEA Network

LEAs are moving forward with supporting staff- and student-owned personal devices on their network as a way to address end-user device obsolescence challenges and sustain 1:1 computing initiatives. In districts that allow BYOD, most users (teachers and students) utilize web-based resources or personal software for research or productivity. The BYOD concerns that have been identified are typically related to one of three areas: a) policy, b) technology including end-user device standards, wireless infrastructure, and security, and c) support programs for personal devices. The majority of LEAs will need to make changes to their security model (policy, design, and monitoring/management) to mitigate the risks associated with BYOD programs. Limiting instructional content to web-accessible applications or using virtual desktop technology simplifies both the required standard for personal devices and the requisite security infrastructure.

Virtual Desktop (VDI)

Many LEAs, as possible solutions to their end-user device challenges, often identified remote hosted desktops and remote virtual applications. Total Cost of Ownership (TCO) savings, the ability to utilize older and disparate equipment to provide the latest version of software to students and staff, and ease of updates/patches and desktop policy management were often identified as the VDI benefits most important to the LEAs. Despite the interest, less than 5% of LEAs have significant VDI deployments. The complexity and high upfront costs for building a VDI environment are barriers to VDI adoption.

Chromebooks

Several LEAs are experimenting with Chromebooks, which use the Google Chrome operating system. Chromebooks are primarily designed to be used while connected to the Internet and use web applications instead of traditional thick client applications.

Remote Desktop Management and Mobile Device Management

The majority of LEAs have invested in Microsoft, Novell, or Apple solutions for desktop management. However, the increasing use of tablets and other mobile end-user devices has LEAs investigating mobile device management (MDM) solutions to compliment their existing desktop management capabilities. MDM is a developing market and vendor solutions are evolving to support a growing set of diverse mobile platforms. Most MDM vendors have SaaS-based solutions, but may be prohibitively expensive for the majority of LEAs. MDM was identified by several LEAs as a possible NCEdCloud service.

Technical Support

On average, technology departments spend 45% to 55% of their time, as measured as a percentage of IT FTEs, providing end-user support. NC K-12 schools technician-to-computer ratios are typically around one technician per 1,200 computers, which compares unfavorably to the IMPACT Model recommendation of one technician per 400 computers. Technical support challenges also include end-user device technical obsolescence, disparate application requirements (e.g. browser versions and plug-ins), an extensive portfolio of applications to manage, and inadequate funding for desktop management tools. As more complex technology-enabled instructional tools are rolled out in the state's schools, adequate technical support will remain an issue. Currently, the technical support capacity in our schools and districts is so strained that many LEAs had a difficult time completing the survey portion of the interview process. While the survey has provided ample information to move forward with NCEdCloud planning and implementation, of the 115 LEAs, 78 did not fully complete the survey (many failed to complete small sections). Forty-one districts did not provide complete cost information.

Wireless Initiatives

Currently, and over the next several years, there is a significant focus on school wireless LAN (WLAN) infrastructure leveraging RttT funds, often driven by online testing "mandates." Unfortunately, in most cases, there are no plans for LEA sustainability. Many LEA and charter school leaders also expressed concerns regarding "fairness" as it relates to the disparity in home Internet access and 24x7 learning environments. Unlike LEA LAN infrastructure where there are two dominant equipment providers (Cisco and HP), five or six vendors WLAN vendors have significant market share in K-12 public schools in North Carolina.

LEA Cloud Computing Initiatives

Cloud Computing is a well-accepted practice in the state's public schools community. LEAs have begun the migration to Cloud Computing services to: a) save money by eliminating on-site hardware and software, b) reduce the pressure on under-staffed technology organizations by shifting support responsibilities to the service providers, and c) simplify client device configurations by using web-accessible applications. LEAs use the Cloud Computing Software as a Service (SaaS) model to access enterprise IT applications such as email and web hosting, or instructional applications such as learning management system (LMS), integrated learning system (ILS), and student and teacher assessments. All LEAs use SaaS applications. The level of Cloud Computing adoption varies across LEAs and is typically determined by:

- IT investment and system lifecycle: LEAs with recent investments in IT infrastructure, e.g. Microsoft Exchange, are unlikely to replace this in-house functionality with a SaaS service in the near-to-medium term. Alternatively,

LEAs with IT assets nearing the end of their useful life are likely to consider SaaS alternatives.

- Technical and functional requirements: comparative analysis of an in-house application versus a SaaS service may favor one approach over the other.
- Financial analysis/Total Cost of Ownership: financial analysis of an in-house application versus a SaaS service may favor one approach over the other.
- Capital Expenditure versus Operational Expenditure/Funding sources: the availability of “one-time” funding may favor the purchase of a software application over the recurring expenses of a SaaS service. Alternatively, recurring expenses that can be accurately forecast and budgeted may be preferred.
- Availability of resources: resource constraints may limit an LEA’s ability to manage the migration to a Cloud Computing application or provide the professional development required to use it. Alternatively, resource constraints may limit an LEA’s ability to support an in-house application.
- Cloud Computing concerns – see below.

The estimated service adoption rates used in the financial sustainability models must reflect these LEA considerations.

Current LEA SaaS implementations are typically disparate with limited data, and identify and access management integration.

Cloud Computing Concerns – General

Loss of physical control and network availability were the primary Cloud Computing concerns expressed during the site interviews. Loss of physical control included issues related to security, data privacy, performance, and reliability. LEAs adopting Cloud Computing adapt their expectations for how much control is reasonable. LEAs are mitigating these concerns by contracting with established and proven Cloud Computing providers, e.g. Google and Microsoft, or using Cloud Computing for their many non-sensitive application needs. Moving applications to a Cloud Computing model requires very reliable network connectivity and sufficient bandwidth. Long-term price uncertainty for Google Apps for Education was also a concern for many LEAs committed to, or considering Google applications.

Cloud Computing Concerns – NC Education Cloud

Financial management, sustainability, and the poor track record of success for state IT initiatives and services, were identified by LEAs as areas of concern specific to the NCEdCloud. Cost is often a primary factor in LEA decisions to participate in state-funded education initiatives. Unforeseen changes in state funding support for an initiative complicate LEA financial management and may lead them to discontinue their participation in an initiative. NCVPS was regularly cited as an example. Similarly, LEAs are concerned that NCEdCloud services may not be financially sustainable after the RttT funding period. LEAs view DPI historically as a “stovepipe organization” in which initiatives are narrowly and rigidly defined. Past IT

initiatives suffer from functional obsolescence (e.g. NC WISE) and limited or no integration resulting in the “inability to extract and aggregate data across applications” (e.g. BUD, HRMS, and CECAS). System use often results in disparate requirements for end-user hardware and software, e.g. screen resolution, browser capabilities and standards, need for plug-ins.

Identity Management

Identity management was routinely noted as a significant challenge for LEAs. Unique or disparate identity management for instructional, business, and enterprise systems costs 25% to 100% of a FTE. (Wayne County Schools estimated in excess of 1 FTE aggregate). This excludes lost instructional time due to student authentication issues. Although all but a few LEAs have deployed directory services (e.g. Microsoft Active Directory or Novell eDirectory), the directory services are rarely integrated with the instructional, business, and enterprise systems. Several LEAs are beginning to address this issue by contracting with technology consulting companies to assist with the application integration. LEAs frequently identified an identity and access management service as a possible NCEdCloud service.

Server Virtualization

Server virtualization is a well-accepted practice in the state’s public schools. LEAs typically understand the technology and have realized cost savings and operational efficiencies when deploying server virtualization.

IP Telephony

Premise-based IP telephony is widely deployed by LEAs across the state and usually replaces obsolete PBX or key systems. Cost savings was typically identified as the primary reason for moving to IP telephony. The premise-based IP telephony systems are supported by LEA staff or by E-Rate Priority 2 Basic Maintenance contracts for those districts eligible for Priority 2 support. (Priority 2: internal connections and basic maintenance - typically only the poorest schools are eligible). Less than 5% of the LEAs currently utilize hosted IP Telephony services and leverage E-Rate Priority 1 support to subsidize the services costs. (Priority 1: telecommunications services and Internet access – all LEAs eligible). However, several LEAs have identified a vendor to host their traditional premise-based IP telephony system in a virtualized environment that would allow the service to be eligible for Priority 1 support.

Operations, Administration and Management

Sufficient network and systems operations, administration, and management (OA&M) tools are typically lacking in LEAs and charter schools. Although many LEAs cited Cloud Computing performance as a concern, few have the capability to baseline end-user performance for locally-hosted applications or compare SaaS application performance to a performance baseline. In addition, effective network availability monitoring and capacity planning are difficult without comprehensive OA&M tools.

Disaster Recovery

Very few LEAs were noted to have comprehensive disaster recovery plans. Data back-up and disaster recovery services were frequently identified by LEAs as possible NCEdCloud Services. Business risk is mitigated as LEAs move to SaaS applications assuming the service provider has an adequate disaster recovery and business continuity program.

Obsolescence or Lack of Integration of Business Support Platforms and Tools

Although business operations was not a focus of the site interview process, these applications were often cited as examples of state-supported systems suffering from functional obsolescence or disparate identity and data systems. Several LEAs indicated that the NCEdCloud should prioritize their work to focus on areas where LEAs currently have to spend money. Business operations systems were cited as an example.

Methodology for Gathering Information

These findings were compiled from interviews of 114 LEAs and 10 representative charter schools, and 300+ question surveys that were administered to all 115 North Carolina's LEAs, and the 10 charter schools. The interviews and accompanying surveys were conducted in three phases. The information gleaned was used to inform the planning process of the NCEdCloud. Interviews began in February 2011 and were completed in October 2011.

The interviews were conducted primarily with technology directors/CTOs, but often included other district and school personnel, including superintendents, assistant or associate superintendents, finance officers, instructional specialists, and instructional technology facilitators. While earlier interviews (the first 54) focused on the results found in an LEA's surveys, later interviews often focused primarily on the district's use of technology to enable instructional outcomes. Other intended outcomes of the interview and survey process were to inform the NC educational community of the NCEdCloud initiatives, and to garner community buy-in.

All districts were provided time to finish the surveys. Districts also were asked to provide purchase orders or other records that indicated the amount of funding spent on software, hardware, infrastructure, and services. Although the window for information gathering remained open almost 10 months, some LEAs failed to complete the survey or provide cost information. Of the 115 LEAs, all but seven LEAs completed a majority of the survey. Forty-one districts did not provide complete cost information. The missing financial information may be indicative of several of the findings documented above (e.g. funding and sustainability, technology governance, and obsolescence or lack of integration of business support platforms and tools).