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Appendix
Executive Summary

This policy study assesses North Carolina’s technology-related policy initiatives that address the State’s K-12 education goals to prepare college- and career-ready students. The analysis is based on a Policy Framework for Assessing Educational Technology Implementation, which was developed by the author of this report, Dr. Chris Dede, and has been used across the nation. The Framework delineates categories of State policies that can enhance educational technology usage to improve student learning and standards-based educational reform. It also provides a process for evaluation the State’s progress toward developing policies that support the effective uses of education technologies in K-12 education. The table below summarizes the framework and the results of the author’s analysis of current North Carolina policies.

<table>
<thead>
<tr>
<th>Essential Questions</th>
<th>Specific Goals</th>
<th>Progress Toward Goal</th>
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<tbody>
<tr>
<td>Does North Carolina ensure that students are globally competitive, future-ready, and healthy and responsible through effective usage of technology to foster learning and assessment?</td>
<td><em>North Carolina is developing a well articulated set of policies and procedures</em></td>
<td>Met</td>
<td>• North Carolina should determine the interrelated suites of understandings and performances by which the state will assess whether students are future-ready.</td>
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<td></td>
<td><em>North Carolina’s policies and procedures address the integrated usage of technology to enhance teaching, learning, and assessment</em></td>
<td>Met</td>
<td>• Curriculum standards revision teams should contain experts in 21st century skills and new forms of digital literacy.</td>
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<td></td>
<td><em>North Carolina’s policies and procedures address the diverse needs of the varied population of learners for whom schools are responsible</em></td>
<td>Partially Met</td>
<td>• These teams should take part in frequent cross-team meetings.</td>
</tr>
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<td></td>
<td><em>North Carolina uses technology tools and services as a vehicle for ongoing improvement of learning and assessment</em></td>
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<td>• The state should review carefully whether the Common Core standards sufficiently incorporate the 21st century skills that are central to North Carolina’s goals and, if necessary, add additional standards.</td>
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<td>Partially Met</td>
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### Essential Questions

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<td>Technology tools and services are currently used as a vehicle for ongoing improvement of teaching and administration, as well as for assessing compliance with these standards</td>
<td>Met</td>
<td>- Resources permitting, North Carolina should move beyond its current support for public access via libraries, community access centers, and community colleges to subsidize parents, organizations, and communities that otherwise likely would not be connected.</td>
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<td>Technology is used as a means for linking the needs of schools with the preparation provided by teacher education programs</td>
<td>Met</td>
<td>- The funding model for virtual courses should provide adequate support for NCVPS and encourage schools and LEAs to enroll students in virtual courses when appropriate.</td>
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<td>North Carolina funds programs and organizations whose mission is to aid educators in achieving these standards</td>
<td>Partially Met</td>
<td>- North Carolina should continue to build data systems that track the growth of individual students, and it should continue to move to longitudinal systems that link student data from preK-12 to college and employment data.</td>
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<td>Has North Carolina developed 21st century technology systems with the capabilities for information exchange, resource sharing, and collaborative action among multiple stakeholders at all levels, to foster leadership for educational innovation?</td>
<td>North Carolina educators and their communities increasingly have access to high bandwidth networking services</td>
<td>Met</td>
</tr>
<tr>
<td>Policies and programs are in place that support collaborative partnerships among districts, higher education, state government agencies, communities, and for-profit and non-profit organizations</td>
<td>Partially Met</td>
<td>- North Carolina should publish updated technology purchasing guidelines linked to educational objectives.</td>
</tr>
<tr>
<td>North Carolina sponsors distance education initiatives, and it participates in consortia for this purpose</td>
<td>Met</td>
<td>- The state should develop a coordinated program of financial support for purchasing technology.</td>
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<tr>
<td>Does North Carolina use 21st century data and administrative systems to provide districts and communities with aggregated, synthesized information about students, teachers, and schools on which to base educational policies and decisions?</td>
<td>The state collects educational statistics from all districts and aggregates and analyzes them</td>
<td>Met</td>
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<td>The state conducts data mining of statistical records and extensively disseminates the results to inform policy and program decisions</td>
<td>Partially Met</td>
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<td>North Carolina provides incentives for districts to use common administrative systems</td>
<td>Partially Met</td>
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<td>Does North Carolina aid districts in designing and purchasing a 21st century technology infrastructure?</td>
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| Does North Carolina provide support for the effective usage and evolution of 21\textsuperscript{st} century educational technology resources? | North Carolina provides vendors with guidelines on desired devices, applications, assistive technologies | Not Met              | • The state should offer vendors incentives for developing devices and applications customized to the state’s needs.  
• The state should consider greater use of open-source software. |
|                                                                                     | North Carolina provides incentives for districts to apply to become designated test-beds for innovation | Met                  | • North Carolina should work with its University and other partners to obtain funding from federal agencies, as well as from private foundations, to support ongoing and more comprehensive research on the impact of its innovative resources. |
|                                                                                     | Systematic state-sponsored research is based on analyses from state-wide database; outcomes inform policy and program decisions | Partially Met        |                                                                                   |
|                                                                                     | North Carolina conducts systematic dissemination, based on transfer and adaptation of innovations via technology service centers and a state electronic network | Partially Met        |                                                                                   |
| Does North Carolina make strategic, planned investments in improving education through technology, including resources for achieving the objectives of supporting the development of: globally competitive, future-ready students who are healthy and responsible; 21\textsuperscript{st} century professionals; leadership for educational innovation; and 21\textsuperscript{st} century technology systems? | North Carolina’s plan for educational technology is aligned with the new overall state strategic plan for educational improvement | Partially Met        | • North Carolina should update plans and policies regarding – and provide ongoing funding for – technology to support educational improvement |
|                                                                                     | North Carolina’s policies are well-developed to complement and supplement Federal and philanthropic funding, research, and equity initiatives | Met                  |                                                                                   |
|                                                                                     | The state’s financial incentives and assistance emphasize districts with unusual challenges, such as those imposed by urban and rural settings or impoverished communities | Met                  |                                                                                   |
Frame

As part of the School Connectivity Initiative, the Friday Institute has completed several assessments of North Carolina’s progress toward ensuring effective incorporation of technology in K-12 education. These assessments, each provided in a separate report, focus on three interconnected aspects of successful technology incorporation – Infrastructure, Policy, and Usage. These reports both describe progress to date and provide frameworks and baseline information that will enable us to assess progress in North Carolina in the coming years. In addition, we also have developed and validated a Student Learning Conditions Survey (SLCS), which will provide data on middle school and high school student perspectives at the school, LEA, and state levels. The SLCS data will enable analyses of changes in student perspectives across years, which will help determine whether technology-enabled initiatives impact students’ views of the learning conditions in their schools.

The four products that constitute the Friday Institute’s work on the School Connectivity Initiative evaluation as of September 2010 are as follows:

- This report, the **Policy Report** – Assessment of state policies that impact, support, or impede the effective use of technology;
- A **K-12 Technology Usage Status Report** – Overview of the state’s transition to the effective use of technology in schools, and recommendations for future connectivity-related research and evaluation;
- A **Technical Report** – Assessment of the state’s progress toward meeting the K-12 technology infrastructure goals set for the School Connectivity Initiative; and
- A **Student Learning Conditions Survey Report** – Development, validation, and piloting of a student-focused statewide survey that measures student perceptions of their learning conditions.
Introduction

The North Carolina State Board of Education specifies the characteristics of globally competitive, “future-ready” students (2006, p. 1) in the following manner:

NC Public Schools Will Produce Globally Competitive Students.

- Every student excels in rigorous and relevant core curriculum that reflects what students need to know and demonstrate in a global 21st Century environment, including a mastery of languages, an appreciation of the arts and competencies in the use of technology.
- Every student’s achievement is measured with an assessment system that informs instruction and evaluates knowledge, skills, performance and dispositions needed in the 21st Century.
- Every student will be enrolled in a course of study designed to prepare them to stay ahead of international competition.
- Every student uses technology to access and demonstrate new knowledge and skills that will be needed as a lifelong learner to be competitive in a constantly changing international environment.
- Every student has the opportunity to graduate from high school with an Associate’s Degree or college transfer credit.

An important aspect of these specifications is that they provide goals for state technology education policy. This policy study assesses the current state technology policy initiatives that address these goals by presenting findings derived from an analysis of North Carolina’s educational technology policies through the lens of a Policy Framework for Assessing Educational Technology Implementation (Appendix), which was developed by the author of this report (Dede, 2004) and updated for use in this analysis. The Framework delineates a menu of ways that State policies can enhance educational technology usage to improve student learning and standards-based educational reform. This analytic method also provides a process for categorizing and charting the evolution of State policies about educational technologies in the overall context of strategic planning to improve schooling.

The Framework consists of a series of essential questions under seven categories (detailed in the Appendix):

A. State Technology Standards and Assessments for Students
B. State Technology Standards, Assessments, Professional Development, and Assistance for Teachers and Teacher Educators
C. State-wide Subsidized 21st Century Technology Systems Linking Districts and Other Stakeholders for Information Exchange, Collaboration, and Distance Education
D. State-wide Programs Providing 21st Century Data and Administrative Systems to Districts (e.g., fiscal databases, student assessment results)
E. State Guidelines for 21st Century Technology-Related Facilities Design, Equipment, Software, Connectivity, and Infrastructure; State-wide Consortium Purchasing Programs (Discounts for Large-Scale Orders) and Funding Support for Technology Acquisition

F. State-Sponsored Research and Evaluation of Educational Technology Initiatives to Foster Leadership for Innovation; to Guide Development of Educational Technology Devices, Applications, and Approaches; and to Encourage Dissemination and Adaptation of Educational Technology

G. State Strategic Plan for Educational Improvement, including Technology-related Objectives; State Funding for Educational Technology Plans and Initiatives

Each essential question is accompanied by a list of more focused and specific questions, as well as by a list of indicators, to guide assessment of the degree to which a state has reached the optimal level implied by each essential question.

This report provides highlights of findings for each of the seven categories above. The Essential Question for each category is included at the top of each section, followed by target levels for each indicator (the Goal for each indicator) and an Assessment (“Met,” “Partially Met,” and “Not Met”) of the degree to which North Carolina has reached those target levels. Some goals designated as “Met” include recommendations for moving beyond the original goal, and each Essential Question section also ends with a brief list of specific recommendations for moving forward.
A. Evaluation of State Standards and Assessments for Students

**Essential Question:** Does North Carolina ensure that students are globally competitive, future-ready, and healthy and responsible through effective usage of technology to foster learning and assessment?

1. Goal – North Carolina is developing a well articulated set of policies and procedures

**Met** – North Carolina has been actively revising its curriculum standards for students at all grade levels, directed towards the objectives of preparing students to be globally competitive, future-ready, and healthy and responsible. The Introduction to the North Carolina Standard Course of Study (2008) documents that North Carolina is altering its curriculum standards from a detailed, prescriptive curriculum to a more flexible guide to instruction. The Course of Study emphasizes preparing students to compete in a global economy, understand and operate complex communication and information systems, and apply higher-level thinking skills to make decisions and solve problems. Five dimensions of thinking are stressed, including creative thinking, critical thinking, and metacognition – all of which are important for competing in a knowledge-based, global economy.

In 2008, the State Board of Education released a report, *Framework for Change: The Next Generation of Assessments and Accountability*, that recommended “deepening the curriculum, defining more specifically the essential content standards in the core subjects, and reflecting 21st century skills in both content standards and aligned assessments” (p. 2). The North Carolina Department of Public Instruction prepared a response to these recommendations that launched a thorough revision of the state’s curriculum standards, including the infusion of 21st century content, thinking and learning skills, and life skills. The strategy of formulating Essential Standards and Objectives, complemented by Supporting Standards and Objectives, provides a good mechanism for building on prior curriculum standards while emphasizing a subset of knowledge and skills critical to future-ready students. Another strength is that, as part of the process for standards evolution, North Carolina intends to validate its curriculum standards for students against the recommendations of the Partnership for 21st Century Skills (2006), the Metiri Group and NCREL (2003), the American Association of Colleges and Universities (2007), and the Organization for Economic Cooperation and Development (2005).

More recently, in June 2010, the North Carolina State Board of Education adopted the new Common Core Standards in mathematics and English language arts, joining with the majority of states in adopting these internationally benchmarked standards. The implementation of these standards will be supported by the state’s recent $400 million award from the United States Department of Education through the *Race to the Top* grant. North Carolina should consider possible additions to these standards to ensure that they sufficiently include the content and processes to prepare future-ready students, in accord with the State Board of Education goals. In addition, North Carolina is a core member the Smarter Balanced Assessment Consortium, a multi-state effort funded by *Race to the Top* funds to develop a new generation of assessments. North Carolina’s commitments to both the Common Core Standards and the Smarter Balanced Assessments position the state well on policies and procedures related to student standards and assessments.
2. Goal – North Carolina’s policies and procedures address the integrated usage of technology to enhance teaching, learning, and assessment

Met – In the particular area of information and communications technology, which is richly interwoven with 21st century skills, North Carolina is building on nationally accepted models such as the revised International Society for Technology in Education (ISTE) student standards for technology in the curriculum (2007), as well as digital literacy standards from the Educational Testing Service ICT Literacy Panel (2007). North Carolina also is working to revise and extend its assessments and mandated minimum outcomes so that these are aligned with the objectives of preparing students to be globally competitive, future-ready, and healthy and responsible. North Carolina is in the process of updating its student technology standards and how they are assessed, an essential step given the changes that have occurred since the current technology standards and assessments were developed (2004).

The format prescribed for the Essential Standards includes the integration of digital literacies. As part of this integration process, aligning state technology standards for students with state content standards for students is important, as is aligning state assessments of students’ progress in meeting technology standards with state assessments of students’ progress in meeting content standards.

3. Goal – North Carolina’s policies and procedures address the diverse needs of the varied population of learners for whom schools are responsible

Partially Met – North Carolina’s curriculum standards and assessments for students currently include provisions for learners with special needs and varied linguistic, cultural, ethnic, and socioeconomic backgrounds, including some educational resources designed for universal usability. This emphasis should remain as the standards evolve. The format prescribed for the Essential Standards includes extended standards for exceptional children. In addition, the North Carolina Virtual Public School serves students who have difficulty obtaining access to classroom settings.

It should be noted, however, that the concepts of Universal Design for Learning (UDL) that are influential in some states do not appear to be widely used in North Carolina. UDL provides a blueprint for creating flexible goals, methods, materials, and assessments that accommodate learning differences, and the widespread availability of technology supports its successful use (CAST, 2009). Further attention to these concepts would be beneficial to teachers and students.

4. Goal – North Carolina uses technology tools and services as a vehicle for ongoing improvement of learning and assessment

Met – The new state strategy of aligning classroom-based formative assessments, benchmarking assessments, and summative assessments as a means of charting student progress is an effective, exemplary approach. Using forms of assessment that go beyond item-based, paper-and-pencil tests also is a strength. The North Carolina Writing Instruction System and the use of
technology-based formative assessment tools of students reading progress are good initial steps in this direction. The state’s technology infrastructure is becoming increasingly capable of supporting these types of sophisticated measurement.

North Carolina provides online resources for model curriculum units and lesson plans that link state content standards and student assessments, and the state periodically updates the online technologies used for access, search, and sharing of these resources. As the state evolves its curriculum standards, extending and updating these resources is a crucial condition for success in preparing future-ready students. North Carolina currently utilizes technology for various aspects of student assessment. Broadening the state’s use of online assessments, and periodically updating assessment methods to reflect advances in this field, is crucial to measuring accurately whether students are attaining “future ready” capabilities.

**Recommendations**

The state’s approach to evolving North Carolina’s student standards and assessments has much to commend and is certainly exemplary among the states.

1. A crucial initial decision is to determine the interrelated suites of understandings and performances, at each developmental stage, by which North Carolina will assess whether students are being prepared as future-ready.

Examples of such interrelated understandings and performances are the College Work and Readiness Assessment, the PISA Assessment, the Key Stage 3 ICT Literacy Assessment, and the P21 curricular skills and ICT literacy maps (Silva, 2008). This decision should not involve choosing particular existing assessments – these will improve in scope and depth – but instead determining the confluence of 21st century understandings and performances that North Carolina will designate as indicators of future-readiness. Such a determination can draw both on the 21st century skills formulations referenced above and on the perceptions of employers about what graduates most need (Levy & Murnane, 2004; North Carolina Business Committee for Education, 2008; Partnership for 21st Century Skills & The Conference Board, 2008). Without first making this determination of the final goals for student outcomes and the developmental steppingstones towards those objectives, altering curriculum standards is equivalent to putting the cart before the horse.

2. Also, the teams charged with revising the curriculum standards in each subject should contain experts who understand which disciplinary concepts are core to work and citizenship, as well as members knowledgeable about 21st century skills and new forms of digital literacy.

3. Further, frequent cross-team meetings will be essential to the formulation process, since the understandings and performances assessed will depend on knowledge and skills developed in multiple subject areas and infused with new digital literacies articulated within and across fields.
4. Finally, North Carolina should review carefully whether the Common Core standards sufficiently incorporate the 21st century skills that are central to North Carolina’s goals and, if necessary, add additional standards (without exceeding the limitation on the proportion of standards that can be added by a state, per the agreement to use the Common Core standards).
B. State Technology Standards and Assessments for Educators; Professional Development and Assistance for Teachers, Teacher Educators, and Administrators

**Essential Question:** Does North Carolina ensure that all educators are 21st century professionals?

1. **Goal** – North Carolina currently has a well-articulated set of standards for educators, policies, and procedures that support the ongoing improvement of teaching and administration in both school districts and teacher preparation programs

**Met** – These standards have been completely revised over the past few years to reflect the complexity of education in the 21st century by emphasizing leadership, teamwork and collaboration, higher-order thinking, authentic assessment, and technology-infused learning. These focus areas align well with the shifts in student standards and assessments described above, and they reflect the sophisticated capabilities required of educators as the state’s technology infrastructure evolves as a result of the School Connectivity Initiative (see the companion Technical Report and K-12 Technology Usage Status Report). The accompanying revised Educator Evaluation System is comprised of detailed rubrics for assessing educators’ proficiency in these areas, including a clear emphasis on the importance of technology.

2. **Goal** – North Carolina’s current policies and procedures address the integrated usage of technology to enhance teaching, learning, assessment, and management in schools and in teacher preparation programs

**Partially Met** – The revisions to educator standards noted above included an alignment of standards across the entire spectrum of educator development, from teacher preparation through ongoing professional development.

However, as more powerful and effective uses of technology become available through state infrastructure initiatives, these and other related policies and procedures will need ongoing revision to ensure that advanced capabilities are used effectively to address the student objectives above. For example, the North Carolina Virtual Public School continues to develop courses with rich Web 2.0 content, but many districts have networking/Internet-safety policies that block these media. As discussed in Section E below, the state could provide technology standards and models of safe network configurations that would encourage districts to participate in virtual learning and would ensure high-quality student experiences that utilize the full range of modern media. The North Carolina E-Learning Commission is an effective mechanism for accomplishing this task and is developing leading-edge visions and policies for the state.

3. **Goal** – Technology tools and services are currently used as a vehicle for ongoing improvement of teaching and administration, as well as for assessing compliance with these standards

**Met** – North Carolina’s Department of Public Instruction and the UNC system make available a range of online resources and tools to aid school-based educators and, to a lesser extent, teacher
educators. These resources are provided through services such as LearnNC and NC WiseOwl (see the companion K-12 Technology Usage Status Report for a more detailed list). As the focus of technology usage changes due to shifts in the student standards and assessments, as well as the new capabilities afforded by the School Connectivity Initiative, expanding and reframing these resources is essential to supporting the new educational objectives the state is championing.

4. Goal – Technology is used as a means for linking the needs of schools with the preparation provided by teacher education programs

Met – Many of the UNC system schools of education utilize technology in their teacher education programs. Many schools offer alternative licensure programs fully online. Additionally, several schools offer graduate programs fully online, especially in high-need areas and courses required for Instructional Technology Facilitator certification. East Carolina University makes available the most extensive online program offerings from undergraduate programs to the Education Specialist degree. Appalachian State University is notable for its use of virtual environments to complete courses for the master’s program in Instructional Technology. The NC State College of Education has just begun requiring that all students in the teacher preparation program have laptop computers, and it has trained faculty to integrate the use of technology into their courses.

5. Goal – North Carolina funds programs and organizations whose mission is to aid educators in achieving these standards

Partially Met – Some online programs for teachers currently are available in North Carolina, such as UNC Online.1 Expanding these initiatives and broadening the array of models provided is essential to effectively building state capacity to achieve its new education directions. The implementation of the e-Learning for Educators program2 in North Carolina, through a partnership of LEARN NC, UNC-TV, NCVPS, NCDPI, NCPAPA, and the Friday Institute, is a good step in this direction.

Recommendation

Overall, North Carolina has strong policies and practices in this area.

1. Resources permitting, the state should accelerate effective usage of technology by teachers through subsidies for districts to purchase high-quality online professional development. This practice is currently the case with the IMPACT schools, but is not widespread.

1 http://online.northcarolina.edu/
2 http://www.learnnc.org/lp/pages/5304
C. State-wide Subsidized 21st Century Technology Systems Linking Districts and Other Stakeholders for Information Exchange, Collaboration, and Distance Education

**Essential Questions:** Has North Carolina developed 21st century technology systems with the capabilities for information exchange, resource sharing, and collaborative action among multiple stakeholders at all levels, to foster leadership for educational innovation?

1. **Goal – North Carolina educators and their communities increasingly have access to high bandwidth networking services**

**Met** – The School Connectivity Initiative is achieving its goals of providing equity of access to all schools in our state (see the companion Technical Report). In parallel, the e-NC authority is working to extend broadband access to all households in the state. The e-NC continues to report growth in access for the state’s communities. In most counties, broadband access is high. However, ongoing public-private partnerships between government and service providers must continue in order to reach all corners of the state. The planned K-12 Education Cloud and related resources and services will further the availability of high bandwidth, reliable access throughout the state. Since the transition costs to cloud computing will be funded largely by the Race to the Top grant, this approach will also provide significant long-term savings to LEAs and the State.

2. **Goal – Policies and programs are in place that support collaborative partnerships among districts, higher education, state government agencies, communities, and for-profit and non-profit organizations**

**Partially Met** – As it develops its portal, the NC eLearning Portal\(^3\) will provide a resource available to PK-20 institutions and can help to assure life-long learning opportunities to enhance North Carolina’s future. Important to realizing this opportunity is the E-Learning Commission’s championship and coordination of the eLearning Portal as the center of education for the constituents it serves, ensuring access to education, vocational training, and entrepreneurship to meet evolving needs.

3. **Goal – North Carolina sponsors distance education initiatives, and it participates in consortia for this purpose**

**Met** – The North Carolina Virtual Public School provides online learning for students throughout the state, and participates in multi-state collaborations. Other distance education initiatives based in the UNC system provide further virtual learning opportunities for high school students throughout the State. See the companion K-12 Technology Usage Status Report for more details.

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\(^3\) [http://www.elearningnc.gov/](http://www.elearningnc.gov/)
Recommendations

Continued funding for these initiatives is very important for the state to achieve its goals of future-ready students and 21st century economic development.

1. Resources permitting, the state should move beyond its current support for public access via libraries, community access centers, and community colleges to subsidize parents, organizations, and communities that otherwise likely would not be connected. A change in federal E-Rate regulations may facilitate such a move, though the state would need to consider carefully how to address the additional administrative burden this move might place on districts and schools. In addition, North Carolina’s recent share of the second round of American Recovery and Reinvestment Act (ARRA) Broadband Technology Opportunities Program (BTOP) awards (awarded on August 18, 2010), which for both rounds now totals $140 million from federal, state, and private sources and is managed by MCNC, will make a significant contribution to moving the state in this direction. Through BTOP, MCNC is providing high-speed connectivity to most of the state’s rural areas with the construction of nearly 1,700 miles of fiber.

2. It is important that the funding model for virtual courses be carefully considered so that it both provides adequate support for NCVPS and encourages schools and LEAs to enroll students in virtual courses when appropriate.
D. Statewide Program Providing 21st Century Data and Administrative Systems to Districts (e.g., fiscal databases, student assessment results)

**Essential Question:** Does North Carolina use 21st century data and administrative systems to provide districts and communities with aggregated, synthesized information about students, teachers, and schools on which to base educational policies and decisions?

1. **Goal – The state collects educational statistics from all districts and aggregates and analyzes them**

   **Met** – NCWISE illustrates North Carolina’s commitment to extending information systems in ways that guide state oversight. Parallel to the effective use of information systems to guide decision making in the corporate sector, investments in North Carolina’s technology infrastructure enable a steady evolution of data collection and analysis related to education. The CEDARS initiative is an important next step toward developing more integrated and powerful data systems.

2. **Goal – The state conducts data mining of statistical records and extensively disseminates the results to inform policy and program decisions**

   **Partially Met** – For this analysis, sufficient information is not available about the use of data mining to inform policy and program decisions. Tools that are in use in some schools, such as SAS Inc.’s EVAAS, provide capability that can be employed for this purpose. The use of data mining and analytics appears to be an area in which the work in NC can be strengthened.

3. **Goal – North Carolina provides incentives for districts to use common administrative systems**

   **Partially Met** – The history of the development and implementation of NCWISE, and the costs involved at both the state and districts levels, is complex. Every district now utilizes NCWISE, but North Carolina should ensure that districts have adequate support and funding for its use, and that useful information from these systems is provided to the districts on a timely basis. Particularly after the longitudinal CEDARS system becomes available, the use of more sophisticated data mining and analytics, as mentioned above, may enable additional valuable information to be provided to the districts.

**Recommendations**

1. North Carolina should continue to build its robust data systems that allow districts to better track the growth of individual students, and it should continue to move to longitudinal systems that link student data from preK-12 to college and employment data. **Race to the Top** support will enhance North Carolina’s ability to further the effective use of K-12 data in the next four years.
2. The state also should capitalize quickly on its new ability to provide more informative and timely analyses to districts and schools. All districts are now connected to the NC Research and Education Network (NCREN) via high-speed fiber connections. This connectivity provides an opportunity to deploy administrative data systems, such as the HRMIS system, using state-of-the-art infrastructure and software as a service models. This connectivity should lead to rapid deployment and use of the CEDARS longitudinal database and the planned Learner Management System.
E. State Guidelines for 21st Century Technology-Related Facilities Design, Equipment, Software, Connectivity, and Infrastructure; State-wide Consortium Purchasing Programs (Discounts for Large-Scale Orders) and Funding Support for Technology Acquisition

**Essential Question:** Does North Carolina aid districts in designing and purchasing a 21st century technology infrastructure?

1. **Goal – North Carolina regularly updates technology purchasing guidelines and infrastructure standards for facilities, equipment, software, connectivity that are based on advances in technology**

**Partially Met** – The state provides standards for technology in new school construction, and promotes a strategic approach to ownership and life-cycle through state-mandated technology plans.

However, the evolution of new technology programs has outpaced policy guidelines to support them. The state continues to struggle with meaningful ways to integrate new programs and built a comprehensive strategic planning model.

2. **Goal – North Carolina has a program for hardware, software, and online services purchasing, with discounts for large-scale orders**

**Partially Met** – The state offers state contract pricing on a wide variety of items. In addition, the K-12 community is now purchasing technology infrastructure systems and services that are similar if not identical to those adopted by the state’s community college and university communities – providing the state even more buying power across K-20. The e-Learning Commission now supports a sub-committee that is dedicated to addressing infrastructure issues.

However, LEAs are not required to utilize these agreements and sometimes find that they can obtain better pricing outside of the State program. Further savings can be obtained by including more products, such as filtering and security software, in the state program.

3. **Goal – North Carolina provides vendors with guidelines on desired devices, applications, assistive technologies**

**Not Met** – In the past these guidelines were provided to LEAs by DPI’s instructional technology division. With the state now investing in more complicated forms of infrastructure, expanding its capacity to provide guidance for vendors makes sense.
Recommendations

North Carolina has a variety of policy options in this area that are not part of the current state portfolio.

1. The state should publish frequently updated technology purchasing guidelines linked to specific types of educational objectives.

2. North Carolina should develop a coordinated program of financial support for purchasing coherent suites of hardware, software, and online services.

3. The state should offer vendors incentives for developing devices and applications customized to North Carolina’s needs.

4. The state should consider greater use of open-source software, which can provide considerable savings to schools.
F. State-Sponsored Research and Evaluation of Educational Technology Initiatives to Foster Leadership for Innovation; to Guide Development of Educational Technology Devices, Applications, and Approaches; and to Encourage Dissemination and Adaptation of Educational Technology

**Essential Question:** Does North Carolina provide support for the effective usage and evolution of 21st century educational technology resources?

1. **Goal – North Carolina provides incentives for districts to apply to become designated test-beds for innovation**

*Met* – Initiatives such as the Learn and Earn schools, IMPACT, and the NC 1:1 Learning Technology Initiative are excellent examples of funding to incentivize innovation and improvement, developing models with the potential to scale broadly across the state. The overarching New Schools Project – with it’s Redesigned High Schools, New Tech High Schools, Early College High Schools, and Redesigned 2.0 High Schools – is a good umbrella under which to coordinate these programs, enabling multiple models to be supported across the state. The recent designation of three learning laboratory schools in Caldwell, Durham, and Wayne counties provides a good step for modeling effective innovations. Finally, the STEM-thematic schools being planned, which will receive support from *Race to the Top* funding, will further extend the number of innovative high schools in the State.

2. **Goal – Systematic state-sponsored research is based on analyses from state-wide database; outcomes inform policy and program decisions**

*Partially Met* – Through the Friday Institute at NCSU, North Carolina is conducting systematic evaluations of technology initiatives, including the collection of evaluations from other sources and usage of analyses from state-wide databases. The formative feedback from these and similar studies inform program improvement and future planning. The value of this type of evaluation already has been established through the national attention gained for the IMPACT projects and the initial findings from the NCVPS and 1:1 Pilot Initiative evaluations.

However, these efforts point to the need for the CEDARS project and data mining, as mentioned above, to make existing data more available and to enable analyses across related sets of data.

3. **Goal – North Carolina conducts systematic dissemination, based on transfer and adaptation of innovations via technology service centers and a state electronic network**

*Partially Met* – The dissemination efforts appear to be spread across multiple organizations, such as DPI, NCVPS, LEARN NC, the New Schools Project, the Friday Institute, and state and regional conferences, meetings, and web sites. While having multiple routes to dissemination is a strength, this arrangement also makes it difficult to ensure that information reaches all target audiences. The NC eLearning Portal is a step in the right direction, but further coordination of dissemination efforts and assessment of their reach are recommended.
Recommendation

1. North Carolina has established a strong set of innovative programs that are implemented in a substantial number of schools, providing a valuable context for leading-edge research. The state should work with its University and other partners to obtain funding from federal agencies, such as the National Science Foundation and the U.S. Department of Education, as well as from private foundations, to support ongoing and more comprehensive research on the impact of these innovations.
G. State Strategic Plan for Educational Improvement, including Technology-related Objectives; State Funding for Educational Technology Plans and Initiatives

**Essential Question:** Does North Carolina make strategic, planned investments in improving education through technology, including resources for achieving the objectives of supporting the development of: globally competitive, future-ready students who are healthy and responsible; 21st century professionals; leadership for educational innovation; and 21st century technology systems?

1. **Goal – North Carolina’s plan for educational technology is aligned with the new overall state strategic plan for educational improvement**

**Partially Met** – North Carolina has provided ongoing support for the School Connectivity Initiative, which has successfully delivered reliable broadband access to each K-12 school, thereby providing the technology foundation to support educational and administrative uses of technology. More recently, the integration into the *Race to the Top* proposal of the plan for the statewide K-12 Education Cloud and related services – which extend the technology foundation to better support the initiatives in the four *Race to the Top* “assurance areas” (standards and assessment, data systems, great teachers and leaders, turnaround of low achieving schools) – positions NC as a national leader in technology infrastructure for schools. The North Carolina E-Learning Commission is an effective mechanism for accomplishing the alignment task and is developing leading-edge visions and policies for the state.

2. **Goal – North Carolina’s policies are well-developed to complement and supplement Federal and philanthropic funding, research, and equity initiatives**

**Met** – There are multiple examples, including the use of federal Title IID funding to support Project IMPACT and the public-private partnership – involving the state, GoldenLEAF Foundation, and SAS – that supports the 1:1 Pilot Initiative. The work of NCTA and NCBCE in coordinating connections between the private sector business community and schools is also exemplary. In addition, North Carolina has shown great success recently in obtaining large BTOP and *Race to the Top* grants.

3. **Goal – The state’s financial incentives and assistance emphasize districts with unusual challenges, such as those imposed by urban and rural settings or impoverished communities**

**Met** – Many of the initiatives described in this analysis are targeted to pupils, schools, and communities with unusual challenges.

**Recommendation**

1. While North Carolina has been strategic in using technology to support educational improvement and has provided significant funding for educational initiatives, this is another
area in which updating plans and policies is warranted. For example, new *cloud computing*, *open-source software*, and *external services* approaches may provide for significant savings, but they also raise issues about centralized versus district responsibilities and decisions.
Conclusion

North Carolina is clearly foremost among states in articulating and implementing a comprehensive plan that links education and economic development for the 21st Century. Continued investments in this vision, despite current economic challenges, are important to achieving a bright future for its citizens.
References


Appendix: Framework for Evaluating North Carolina Technology Policies

This Framework describes ways that North Carolina state policy can enhance educational technology usage to improve four objectives specified by the North Carolina State Board of Education. The Framework presents a process for categorizing and charting the evolution of state policies for educational technologies in the overall context of strategic planning to improve schooling.

The categories in this Framework provide a menu for potential state policy actions, as well as a common template for comparative policy discussions among the stakeholders that determine policy. The Framework indicators depict an evolutionary path for the progression of State policy, while allowing for variation among States depending on individual circumstances and political philosophy. The essential questions highlight the issues involved in these policies.

Categories of NC State Policies for Educational Technology Implementation

A. State Technology Standards and Assessments for Students

B. State Technology Standards, Assessments, Professional Development, and Assistance for Teachers and Teacher Educators

C. State-wide Subsidized 21st Century Technology Systems Linking Districts and Other Stakeholders for Information Exchange, Collaboration, and Distance Education

D. State-wide Programs Providing 21st Century Data and Administrative Systems to Districts (e.g., fiscal databases, student assessment results)

E. State Guidelines for 21st Century Technology-Related Facilities Design, Equipment, Software, Connectivity, and Infrastructure; State-wide Consortium Purchasing Programs (Discounts for Large-Scale Orders) and Funding Support for Technology Acquisition

F. State-Sponsored Research and Evaluation of Educational Technology Initiatives to Foster Leadership for Innovation; to Guide Development of Educational Technology Devices, Applications, and Approaches; and to Encourage Dissemination and Adaptation of Educational Technology

G. State Strategic Plan for Educational Improvement, including Technology-related Objectives; State Funding for Educational Technology Plans and Initiatives
A. State Technology Standards and Assessments for Students

Essential Questions

Does North Carolina ensure that students are globally competitive, future-ready, and healthy and responsible through effective usage of technology to foster learning and assessment?

- Does North Carolina have a well articulated set of policies and procedures that support the ongoing improvement of learning to develop students who are globally competitive, future-ready, and healthy and responsible?
- Do these policies and procedures specifically address the integrated usage of technology to enhance teaching, learning, and assessment?
- Do these policies and procedures specifically address the diverse needs of the varied population of learners for whom schools are responsible?
- Are technology tools and services used as a vehicle for ongoing improvement of learning and assessment to produce graduates who are globally competitive, future-ready, and healthy and responsible?

Indicators

- State has technology standards and assessments for students at all grade levels, directed towards the objective of preparing students to be globally competitive, future-ready, and healthy and responsible.
- State validates its technology standards for students against national models such as ISTE and P21 standards
- State technology standards for students include provisions for learners with special needs and varied linguistic, cultural, ethnic, and socioeconomic backgrounds, including educational resources designed for universal usability
- State technology standards for students are integrated into and aligned with state content standards for students
- State assessments of students’ progress in meeting technology standards are integrated into and aligned with state assessments of students’ progress in meeting content standards
- State provides online resources for model curriculum units and lesson plans linking state content standards and student assessments
- State assessment strategies exemplify effective use of technology for assessment
- State provides incentives to develop virtual learning environments for students who have difficulty obtaining access to classroom settings and for all pupils’ educational access outside of classroom settings
B. State Technology Standards and Assessments for Educators; Professional Development and Assistance for Teachers, Teacher Educators, and Administrators

Essential Questions

Does North Carolina ensure that all educators are 21st century professionals?

- Does the State have a well articulated set of policies and procedures that support the ongoing improvement of teaching and administration in both school districts and teacher preparation programs, specifically directed to preparing students who are globally competitive, future-ready, and healthy and responsible?
- Do these policies and procedures specifically address the integrated usage of technology to enhance teaching, learning, assessment, and management in schools and in teacher preparation programs?
- Are technology tools and services used as a vehicle for ongoing improvement of teaching and administration, as well as for assessing compliance with these standards?
- Is technology used as a means of linking the needs of schools with the preparation provided by teacher education programs?
- Is state financial assistance provided to enable districts and teacher preparation programs to meet these standards and use technology as a means of professional development?
- Does the state fund programs and organizations whose mission is to aid educators in achieving these standards?

Indicators

- State sets technology standards for all teachers, administrators, and teacher educators
- State technology standards for teachers, administrators, and teacher educators center on technology integration and 21st century professional knowledge and skills
- State technology standards for teachers, administrators, and teacher educators are validated against national models such as ISTE standards for teachers, NCATE standards for teacher educators, and P21 guidelines for educators
- State technology standards for teachers are integrated into other state teacher standards and aligned with student technology and content standards
- State assessments of teachers’, administrators’, and teacher educators’ progress in technology standards are based on integration into content areas and exemplify effective use of technology for assessment
- State assistance is provided for developing district and teacher education program professional development plans in technology usage, in students’ safe and acceptable use of technology, and in copyright and intellectual property issues.
- State financial incentives for professional development include administrators and state level leaders
- State financial incentives for professional development emphasize effective technology usage across the curriculum and in student assessment
- State financial incentives for professional development emphasize districts with unusual challenges, such as urban and rural settings and impoverished communities
State support for professional development includes aid for exemplary technology usage in professional development (e.g., virtual communities-of-practice and distant mentoring), as well as increased time for educators' planning.

State provides technical training programs for school and district technology-coordinators, teacher education program faculty, instructors of content courses for teachers.

State-provided regional technology centers aid all educators (including instructors of content courses for teachers), including providing quality reviews and adoption guidelines for digital resources.
C. State-wide Subsidized 21st Century Technology Systems Linking Districts and Other Stakeholders for Information Exchange, Collaboration, and Distance Education

Essential Questions

Has North Carolina developed 21st century technology systems with the capabilities for information exchange, resource sharing, and collaborative action among multiple stakeholders at all levels, to foster leadership for educational innovation?

- Do educators and their communities have access to high bandwidth networking services?
- Do state subsidies for these services give priority to parents, communities, and organizations who otherwise would likely not be connected?
- Are policies and programs in place that support collaborative partnerships among districts, higher education, state government agencies, communities, and for-profit and non-profit organizations?

Indicators

- All districts, schools, parents, communities, and teacher preparation institutions are connected via a State-subsidized electronic network
- State financial incentives for participating in the network emphasize districts, parents, and communities with unusual challenges, such as urban and rural settings and impoverished communities
- All schools and teacher preparation institutions have high-speed connections to the State network
- State creates incentives for districts and teacher preparation institutions to receive discounts in implementing and maintaining the network
- State provides financial incentives and logistical support for districts collaborating electronically with other districts, higher education, industry, other social service providers
D. State-wide Program Providing 21st Century Data and Administrative Systems to Districts (e.g., fiscal databases, student assessment results)

Essential Questions

Does North Carolina use 21st century data and administrative systems to provide districts and communities with aggregated, synthesized information about students, teachers, and schools on which to base educational policies and decisions?

- Does the State encourage districts to collect data in ways that facilitate aggregation and analysis?
- Does the State provide financial incentives for districts to participate in data-based decision making?
- Does the State analyze comparative data from schools to assess alternative educational interventions and disseminate the results to parents, communities, and districts?

Indicators

- State provides incentives for districts using common administrative systems
- State provides financial incentives for participating in data collection and analysis emphasize districts with unusual challenges, such as urban and rural settings and impoverished communities
- Educational statistics are collected from all districts and aggregated and analyzed by the State
- Data mining of statistical records is conducted by the State, extensively disseminated, and informs policy and program decisions
E. State Guidelines for 21st Century Technology-Related Facilities Design, Equipment, Software, Connectivity, and Infrastructure; State-wide Consortium Purchasing Programs (Discounts for Large-Scale Orders) and Funding Support for Technology Acquisition

Essential Questions

Does North Carolina aid districts in designing and purchasing a 21st century technology infrastructure?

- Does the State provide guidelines for purchasing equipment, software, and connectivity and for designing or renovating facilities, including special guidelines for 1-1 computing initiatives?
- Does the State negotiate volume purchasing discounts from suppliers and vendors?
- Does the State provide financing for technology infrastructure, and does this support give priority to districts that face economic challenges?

Indicators

- State technology purchasing guidelines stress evolutionary, strategic approaches in developing infrastructures for new and existing facilities and for installations of equipment, software, and connectivity
- State technology infrastructure standards are integrated with districts’ and teacher education programs’ educational plans
- Based on advances in technology, the State regularly updates technology purchasing guidelines and infrastructure standards for facilities, equipment, software, connectivity
- State has a program for hardware, software, and online services purchasing, with discounts for large-scale orders
- State provides extensive financial support for hardware, software, and online services purchasing
- State financial incentives for technology and infrastructure development emphasize districts with unusual challenges, such as urban and rural settings and impoverished communities
F. State-Sponsored Research and Evaluation of Educational Technology Initiatives to Foster Leadership for Innovation; to Guide Development of Educational Technology Devices, Applications, and Approaches; and to Encourage Dissemination and Adaptation of Educational Technology

Essential Questions

Does North Carolina provide support for the effective usage and evolution of 21st century educational technology resources?

- Does the State assess the effectiveness of its technology investments through conducting research and evaluation studies?
- Does the State sponsor the development of technologies customized to its needs?
- Does the State provide means by which districts can adapt innovations successful elsewhere?

Indicators

- Systematic State-sponsored research is based on analyses from state-wide database; outcomes inform policy and program decisions
- State provides incentives for districts to apply as designated testbeds for innovation, evaluation
- State conducts systematic evaluation of technology initiatives, including collection of evaluations from other sources and usage of analyses from state-wide database; outcomes inform policy and program decisions
- State provides vendors with guidelines on desired devices, applications, assistive technologies
- State offers vendors incentives for developing desired devices and applications and for involving local teachers in adapting standards-based software
- State sponsors educational technology development, including distance education, as well as participation in consortia for this purpose
- State conducts systematic dissemination, based on transfer and adaptation of innovations via technology service centers and State electronic network
- State research, development, and dissemination initiatives emphasize technological innovations that could improve equal educational opportunity
G. State Strategic Plan for Educational Improvement, including Technology-related Objectives; State Funding for Educational Technology Plans and Initiatives

Essential Questions

Does North Carolina make strategic, planned investments in improving education through technology, including resources for achieving the objectives of supporting the development of: globally competitive, future-ready students who are healthy and responsible; 21st century professionals; leadership for educational innovation; and 21st century technology systems?

- Does the State have a strategic process for educational improvement to which the State technology plan is aligned?
- Does the State provide systematic long term funding for achieving the objectives of its technology plan?
- Does the State leverage its educational technology investments with related funding from other sources?

Indicators

- State plan for educational technology is aligned with overall State strategic plan for educational improvement
- Evaluation is an integral part of the State plan for educational technology, assessing the impact of all major initiatives
- State plan for educational technology incorporates insights and lessons learned from other States, federal efforts
- State plan for educational technology emphasizes innovations that could improve equal educational opportunity
- State plan for educational technology provides systematic, long-term funding support for professional development for teachers, administrators, and teacher educators
- State provides systematic funding for capital investments in educational technology infrastructure, including depreciation
- State provides systematic, long-term funding support for hardware, applications, connectivity, and professional development
- State funding provides systematic, long-term support for adequate staffing in technology usage
- State provides assistance in applying for funded educational technology initiatives
- State provides matching funds to foster participation in Federal and philanthropic educational technology initiatives
- State policy is developed to complement and supplement Federal and philanthropic funding, research, and equity initiatives
- State financial incentives and assistance emphasize districts with unusual challenges, such as urban and rural settings and impoverished communities