

Examining Issues Critical to a 1:1 Learning Environment: Executive Summary

Evaluation Report on the Progress of the North Carolina 1:1 Learning Technology Initiative (Year 3)

Submitted to

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Introduction

In the spring of 2008, the North Carolina State Board of Education awarded a contract to the Friday Institute for Educational Innovation to conduct a three-year evaluation of the NC 1:1 Learning Technology Initiative (NCLTI). The pilot schools that took part in the evaluation include eight Early College high schools and ten traditional high schools, with a total across the 18 schools of approximately 9,500 students and 600 school staff. Every teacher and student in these schools received a laptop computer, and wireless Internet access was provided throughout the school. The overall goal of the initiative is for the use of technology to improve teaching practices, increase student achievement, and better prepare students for work, citizenship, and life in the 21st century. The intent of the Friday Institute's evaluation is to: provide information about whether the initiative enhanced student learning; and identify challenges to successful implementation of 1:1 programs, strategies for meeting those challenges, and services and supports needed to enable successful programs throughout the State.

Public-Private Partnership

A consortium of public and private enterprises provided the framework and logistics necessary for such a large-scale initiative. These organizations teamed up to provide funding for this initiative involving both Learn and Earn Early College High Schools (ECHS) and traditional public high schools. Funding was provided by partners as follows: North Carolina Department of Public Instruction (NCDPI) provided state funding for infrastructure, professional development, and evaluation; SAS provided funding for teacher laptops; Golden Leaf Foundation provided funding for student laptops; and The Friday Institute for Educational Innovation supported the 1:1 Learning Collaborative, a resource-rich website and professional development program targeting 1:1 projects. Representatives from each of these organizations met monthly as a steering committee to discuss and address any issues related to the implementation of the pilot project.

Schools that were not implementing 1:1 programs that were similar to the pilot schools in type, size, student demographics, and student achievement on prior-year English and Algebra I End-of-Course tests were selected to provide comparative data. Many of the comparison schools had a substantial amount of technology available for instructional purposes.

This evaluation study focused on the progress of NCLTI schools toward establishing a functioning 1:1 environment. The evaluation was based on data from teacher and student surveys, focus groups, interviews, and classroom observations, as well as on analyses of existing school-level data. The intent of the evaluation was to provide information about the degree to which the initiative contributed to enhancements in student learning, as well as to identify challenges to the successful implementation of 1:1 programs, strategies for meeting those challenges, and services and supports needed to enable successful programs throughout the State.

The participating 1:1 and comparison schools were grouped into cohorts based upon when a 1:1 school began full implementation of its 1:1 initiative:

- Cohort A – distributed laptops to students during the 2008 school year
- Cohort B – distributed laptops to students during the 2009 school year
- Cohort C – distributed laptops to students during the 2010 school year

This brief provides an overview of findings published in previously-released reports on student outcomes, leadership, and instructional practice in 1:1 schools.

Student Outcomes

Graduation rates slightly improved. Graduation rates for most participating high schools increased. Also, graduation rates for minorities increased slightly over time. Although these results were positive and promising, there were not significant changes over time.

Student engagement increased. Survey results indicated that staff at the participating schools generally agreed that the use of technology for teaching and learning increased student engagement. Student surveys revealed that students agreed that the more teachers used technology in class, the more they are interested in and enjoy school (Table 1).

Table 1. Self-Reported Student Engagement

Survey Item	Proportion Agreeing/Strongly Agreeing			
	Overall	Cohort A	Cohort B	Cohort C
Teachers: My students are more engaged when we are using the laptops.	56.6% (n=440)	64.8% (n=128)	60.5% (n=157)	45.8% (n=155)
Students: I am more involved in school when we are using the laptops.	55.5% (n=3,561)	59.9% (n=1,091)	52.1% (n=1,687)	47.9% (n=783)
Students: I am more interested in school when we are using the laptops.	58.2% (n=3,561)	63.3% (n=1,091)	54.0% (n=1,687)	52.6% (n=783)

Consistently, a high proportion of students demonstrated positive indicators of engagement in observed 1:1 classrooms (Table 2).

Table 2. Observed Student Engagement.

Observation Protocol Item	Cohort A 2007-08 , (n=56)	Cohort A & B 2008-09, (n=58)	Cohort A, B, & C 2009-2010 , (n=82)
Sustained behavioral involvement	86.40%	87.90%	87.60%
Positive emotional tone	88.90%	89.30%	87.60%
Exerted effort and concentration	85.00%	87.60%	85.10%

Students developed 21st century learning skills. Teachers in participating schools indicated that their students used technology at least once a week to complete tasks related to 21st century learning skills. In addition, more than half of all students surveyed indicated agreement or strong agreement that use of technology at their schools helps them develop key 21st century learning skills (Table 2).

Table 2. Acquisition of 21st Century Learning Skills

Survey Item	Proportion of High School Students Agreeing			
	Overall	Cohort A	Cohort B	Cohort C
I complete tasks related to 21 st century skills daily or weekly	56.6% (n=440)	64.8% (n=128)	60.5% (n=157)	45.8% (n=155)
Use of my laptop has helped me develop key 21 st century skills	60.2% (n=3,788)	65.8% (n=1,054)	58.2% (n=1,549)	56.3% (n=781)

Analysis of student standardized test scores for the 2009-2010 school year showed attendance at a 1:1 school had no significant impact.

Statistical analyses were conducted on students’ 2010 EOC scores for Algebra 1, Algebra 2, Biology, English 1, Civics, and US History to determine the effects of 1:1 implementation between 1:1 schools and comparison schools. Results indicated that 1:1 implementation had no significant ($\alpha = .05$) effect on a student’s EOC score for any of the subject areas, while controlling for the following variables:

1. School level: EC high school versus traditional high school, ABC distinction, percent of minority students, percent of students receiving free or reduced lunch, and urbanicity of school district (based on district size and distance from large city)

2. Student level: previous achievement in math and/or reading, minority status, economic disadvantage status, disability status, limited English proficiency status, grade enrollment, and sex

Results of these multi-leveling modeling analyses indicated that the best predictor for any of the EOC scale scores was previous achievement as determined by 8th grade EOG scores. When focusing only on the 1:1 schools, results of multi-level modeling analyses showed there were no significant effects on students’ 2010 EOC scores based on the length of 1:1 implementation, the quality of 1:1 implementation, or teachers’ ratings of principal leadership when controlling for the following variables:

1. School level: EC high school versus traditional high school, ABC distinction, percent of minority students, percent of students receiving free or reduced lunch, and urbanicity of school district (based on district size and distance from large city)
2. Student level: previous achievement in math and/or reading, minority status, economic disadvantage status, disability status, limited English proficiency status, grade enrollment, and sex

Results of these analyses were consistent with previous analyses—the best predictors of EOC scores were previous achievement scores. For both sets of analyses, results also provided limited support for well-documented achievement differences related to disability and ABC distinction status.

Instructional Practice

Overall, laptops were used for multiple facets of instructional practice. Teachers used the laptops for administrative tasks as well as for instructional tasks. Laptops made communication faster and more effective for teachers and students. Many shy students appreciated not having to go to the front of the room to talk to their teachers. Teachers became facilitators of learning who helped students improve their quality of work and enjoy school. Teachers of non-EOC courses reported they were able to integrate technology more freely than did teachers of courses with high-stakes tests. Numerous teachers expressed the desire for more time to teach students creative, tech-savvy, and challenging lessons. Finally, teacher use increased over time, as illustrated by trends across cohorts where Cohort A’s results tend to be more positive where they have been implementing their 1:1 project the longest.

Teachers increased use of technology for both planning and instruction. Many schools reported that collaboration across subjects, grade levels, and even schools increased. Teachers reported using technology daily for creating instructional materials and managing student information, and that they had better-organized lesson plans as a result. They also reported using technology most often during class for presenting content, providing directions, and accessing online textbook resources (Table 3), and students noticed these change in several content areas (Table 4). In general, schools across the cohorts made important gains in the frequency with which they used technology across the study period.

Table 3. Teacher technology use for planning and instruction.

Proportion of High School Teachers Reporting Daily/Weekly Technology Use

Survey Item	Overall (n=440)	Cohort A (n=128)	Cohort B (n=157)	Cohort C (n=155)
Daily or Weekly Technology Use for Planning	62.3%	66.7%	66.0%	54.8%
Daily or Weekly Technology Use for Instruction	42.6%	51.5%	51.2%	38.2%

Table 4. Student technology use in various content area courses

Proportion of High School Students Reporting Daily/Weekly Technology Use, by Subject Area (n=3,427)

Survey Item	LA	Math	Science	SS	For. Lang.	Electives
Daily or Weekly Technology Use	51.5%	35.0%	44.6%	44.8%	27.5%	45.0%

Teachers moved from assigning independent work to designing collaborative, project-based lessons. Students, teachers, and administrators all commented during focus groups that technology enabled different modes of student collaboration. Data indicated that, as teachers became more comfortable with using the technology in class, they moved from requiring independent work from students to encouraging more collaborative, project-based activities (Table 5).

Table 5. Technology and collaboration in the classroom

Survey Item	Proportion Agreeing/Strongly Agreeing			
	Overall	Cohort A	Cohort B	Cohort C
Teachers: The quality of my students' work increases when we use the laptops.	56.6% (n=440)	64.8% (n=128)	60.5% (n=157)	45.8% (n=155)
Students: The quality of my work increases when I use the laptops.	58.2% (n=3,561)	63.3% (n=1,091)	56.8% (n=1,687)	53.6% (n=783)

Teachers shifted to technology-enhanced modes of assessment. Technology helped teachers embed ongoing assessments into instruction to monitor student learning and to adjust instruction effectively and efficiently (Table 6).

Table 6. Teachers' use of technology for assessment

Survey Item	Proportion of Teachers Reporting Daily or Weekly			
	Overall	Cohort A	Cohort B	Cohort C
Assess and grade student work.	68.6% (n=440)	73.4% (n=128)	74.5% (n=157)	58.7% (n=155)
Collect formative assessment data for your instructional planning.	51.6%	57.0%	54.8%	43.9%

Leadership

Successful 1:1 projects have principals who effectively communicate with staff and support staff development efforts. Based on teacher, administrator, and principal evaluations of leadership, on average, principals in 1:1 schools from all cohorts exhibit effective leader behavior. Effective leadership is most readily apparent in the areas of Communication and Professional Development. Two leadership dimensions with typically low ratings were Advocacy and Evaluation. This pattern occurs even in schools that have had laptops the longest, suggesting that professional development sessions for principals of 1:1 schools may need to focus on these two areas, and that 1:1 school communities may benefit from a mechanism that holds principals accountable for behaviors consistent with these two dimensions. Qualitative data analyses consistently indicate that successful 1:1 principals are visionaries, provide support for professional development, and advocate shared decision-making.

Principals need time to become successful leaders of 1:1 projects. Even though all 1:1 principals in these studies received positive ratings of leadership on average, teachers in schools that have been implementing 1:1 programs longer gave higher ratings to their principal on all dimensions of leadership. One explanation could be that principals with more experience in 1:1 environments are more likely to exhibit behaviors associated with effective leaders because they have had time to learn and implement these behaviors. Principals of EC high schools received higher ratings on five of seven leadership dimensions; likely as a result of the specific structure and purpose of EC high schools, which lend themselves more readily to successful implementation of 1:1 environments. EC high schools are smaller,

and, because attendance is based in part on completion of an application, may host a student population more predisposed to adapting to a 1:1 environment. The small size may provide teachers with more opportunities to observe their principals' behaviors, and size coupled with student choice to attend the school contribute to fewer discipline problems—leaving principals more time and energy to devote to successful implementation of a 1:1 initiative.

Principals influence teacher attitudes toward 1:1. Survey results suggest that principals who are vocal advocates of the 1:1 initiative and who can clearly articulate a vision for 1:1 can dramatically improve teachers' attitudes towards teaching with laptops. In addition, teachers who believed that their principals included them in the decision-making process regarding the initiative indicated more positive attitudes toward laptops and learning. However, teachers' use of technology and comfort with technology skills were not as directly influenced by their principals' leadership. There is also some indication that quality of leadership (as measured by survey results) contributes significantly to increases in student achievement (as measured by changes in EOC scores); principal leadership also may impact less easily measurable but equally as important student outcomes, such as student engagement, 21st century skill acquisition, and workforce readiness.

This report provides a summary of the results of several detailed explorations conducted during the three-year NCLTI evaluation. The participating schools continue to build on the critical components of an effective 1:1 computing environment.

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