Examining Issues Critical to a 1:1 Learning Environment: English Language Learners


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December 17, 2010
Critical Issue Series 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) pilot schools. The evaluation includes 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. In these schools, every teacher and student received a laptop computer, and wireless Internet access was provided throughout the school. The overall goal of the initiative is to use the 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 evaluation was to provide information about whether the initiative enhanced student learning, as well as to 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.

This paper is one in a series of six papers that provide detailed explorations of several critical issues that emerged during the NCLTI evaluation. After a brief overview of the NCLTI initiative and its evaluation, this paper examines the impact of the NC 1:1 Learning Technology Initiative on various aspects of the learning experience of English Language Learners (ELLs). The No Child Left Behind Act of 2001 defines Limited English Proficient students as being 3 to 21 years of age; prepared to enroll or enrolled in an elementary or secondary school; not born in the United States or whose native language is other than English; and have difficulties in speaking, reading, writing, or understanding English that prevent them from succeeding in an English-only classroom (No Child Left Behind Act of 2001).

Review of 1:1 Literature

Schools across the United States have implemented 1:1 laptop initiatives with the aim of preparing future-ready students by developing skills needed for college and the workforce (Warschauer, 2006; Weston & Bain, 2010). Research defines 1:1 as an initiative that: a) provides every student and teacher with a personal digital wireless device with up-to-date software and access to the Internet at school (Penuel, 2006); and b) focuses on using those devices to meet specific teaching and learning goals (Muir, Manchester, & Moulton, 2005) such as increasing equity of access to technology, transforming quality of instruction, increasing student engagement, improving academic achievement and technology literacy, increasing economic competitiveness, and enhancing home-school connections.

While overall results are mixed, recent studies have shown that carefully implemented 1:1 laptop initiative programs can increase students’ general learning outcomes (Warschauer, 2006; Weston & Bain, 2010). While there is evidence that 1:1 programs do not increase test scores in all situations, especially in the case of paper-and-pencil tests (Warschauer, 2006; Weston & Bain, 2010), several studies have provided evidence that the use of laptops in the classroom can lead to increases in students’ math and writing skills (Bebell, 2005; Selater, Sicoly, Abrami, & Wade, 2006; Warschauer, 2006) and overall achievement (Shapley, Sheehan, Maloney, & Caranikas-Walker, 2010; Suhr, Hernandez, Grimes, & Warshauer, 2010). Results of other programs have shown improvement in attendance (Lane, 2003; Mills, 2006) and engagement (Bebell & Kay, 2010; Mitchell Institute, 2004; Warschauer, 2006), and one study’s results indicated a decrease in disciplinary problems (Bebell, 2005).

Factors other than the distribution of laptops alone contribute to successful implementation. Teacher support for the initiative, effective instructional use of the technology, technical support, robust technical infrastructure, and quality of implementation are all influential in the success of a 1:1 laptop program (Weston & Bain, 2010). Schools must have not only the capability to use laptops for instruction effectively but also clear strategies and supports in place for ensuring effective student laptop use (Warschauer, 2006), including adequate hardware and software resources and strong leadership to guide the program (Klieger, Ben-Hur, & Bar-Yossef, 2010; Mainger & Holden 2009; Silvernail & Lane, 2004). Teachers’ beliefs mediate the way they use technology in the classroom, and if teachers do not
support the initiative they are less likely to integrate the laptops into their lesson plans (Antonietti & Giorgetti, 2006; Churchill, 2006; Ertmer, Addison, Lane, Ross & Woods, 2000; Penuel, 2006). Thus, in addition to school and district support, successful 1:1 initiatives require teachers to have access to professional development or tools that can aid them in integrating laptops into lesson plans (Klieger, Ben-Hur & Bar-Yossef, 2010; Penuel, 2006; Silvernail & Lane, 2004; Weston & Bain, 2010). Professional development experiences can enhance teachers’ technology knowledge and skill level and therefore can improve the use of laptops in the classroom as well as teacher attitudes toward the technology (Kanaya, Light & Culp, 2005; King, 2002; Maninger & Holden, 2009; Swan & Dixon, 2006; Swan, Kratcoski, Mazzer & Schenker, 2005).

Research involving ELL students immersed in a 1:1 environment is limited in the 1:1 literature which focuses primarily on the impact of the 1:1 environment on the areas of writing and reading. Warschauer (2006), and Grimes and Warschauer (2008), found that students used laptops extensively in all stages of the writing process: prewriting, writing drafts, rewriting, and dissemination. Grimes and Warschauer (2008) reported an association between 1:1 learning and improvement of students’ writing ability and performance on writing assessments. In addition, Warschauer (2006) also reported that students used laptops in connection with reading strategies, such as scaffolding and epistemic or knowledge-building purposes. Other studies have shown that students’ writing skills, which are essential for ELL students’ academic success, increased after students started participating in a 1:1 initiative (Gulek & Demirtas, 2005; Lowther, Ross & Morrison, 2003; Mouza 2008; Rockman, 2003).

Project Overview

Schools/Participants

The 18 1:1 pilot high schools are located across North Carolina (Figure 1) in areas that reflect the state’s diverse geographic, economic, and cultural landscapes.

![Map of 1:1 pilot high schools in NC.](image)

**Figure 1.** Map of 1:1 pilot high schools in NC.

**Cohort A**
1:1 Traditional
This cohort includes one large, long-established traditional high school in a rural eastern school district. This district has two other traditional high schools that do not participate in the 1:1 initiative. The school’s 86 teachers serve a diverse population of 1,300 students. The school distributed laptops to teachers in the spring semester of the 2006-2007 school year and to students in the fall semester of the 2007-2008 school year.

1:1 EC
This cohort includes seven EC high schools located in seven different school districts. These schools, located on community college campuses, are designed to attract students from populations that are often underrepresented in college: racial minorities, students from low-income families, and those whose parents never attended college. Students in EC high schools graduate with both a high school diploma and two years of transferable college credit or an associate’s degree. In most cases, EC students stay in high school five years to complete their high school and college courses requirements. EC high schools are typically very small, with a maximum of 100 students per grade. The seven 1:1 EC Cohort A schools distributed laptops to teachers in the fall semester of the 2007-2008 school year and to students in the spring semester of the 2007-2008 school year.

Cohort B
1:1 Traditional
This 1:1 Cohort includes four traditional high schools located in two districts that are participating in a district-wide implementation of 1:1. Three of the schools, located in a rural district in the eastern part of the state, distributed laptops to teachers in the fall semester of the 2008-2009 school year and to students in the spring semester of the 2008-2009 school year. The fourth school, located in a school district in the central region of the state, distributed laptops to teachers in the spring semester of the 2007-2008 school year and to students in the fall semester of the 2008-2009 school year.

Cohort C
1:1 Traditional
Traditional Cohort C includes five high schools located in two districts. Four schools, located in a rural district in the western part of the state, distributed laptops to teachers during the spring semester of the 2008-2009 school year. Twelfth-grade students received their laptops in the fall semester of the following school year. The fifth school is in a rural district in the central part of the state that provided laptops to teachers district-wide in September 2005 and to students in September 2009. The high school selected for laptop distribution to students is one of three high schools in the district.

1:1 EC
This cohort is made up of a new EC high school that distributed laptops to its teachers in September 2009 and to its incoming ninth grade students in November 2009.

Table 1. 1:1 School Cohorts

<table>
<thead>
<tr>
<th>Cohort</th>
<th>School</th>
<th># Students</th>
<th># Teachers</th>
<th>Laptops Distributed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Trad1</td>
<td>1,344</td>
<td>84</td>
<td>To teachers: March 2007 To students: September 2007</td>
</tr>
<tr>
<td>A</td>
<td>EC1</td>
<td>112</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC2</td>
<td>132</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC3</td>
<td>138</td>
<td>5</td>
<td>To teachers: November 2007</td>
</tr>
<tr>
<td></td>
<td>EC4</td>
<td>243</td>
<td>13</td>
<td>To students: March 2008</td>
</tr>
<tr>
<td></td>
<td>EC5</td>
<td>153</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>EC6</td>
<td>193</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>
Of the 1:1 teacher population (n=595): 93% are fully licensed; 25% have advanced degrees, and 15% are National Board Certified; 18% have less than three years of experience, 26% have between four and ten years of experience, and 56% have more than ten years of experience. Of the 1:1 student population (n=9764), 0.5% are American Indian, 1% are Asian, 9% are Hispanic, 30% are Black, and 60% are White.

Data Sources and Evaluation Questions
The data summarized in this report were collected in recurring cycles from the 1:1 schools in April 2008, September 2008, April 2009, September 2009, and April 2010. At each point in the cycle, surveys were administered to three distinct groups: administrators (principal, assistant principal, technology facilitator, guidance counselor, etc.), classroom teachers, and students. Also, site visits to every 1:1 school were made that included classroom observations, interviews with school technology facilitators, and separate focus groups with school leadership, teachers, and students. Archival data analyzed included attendance, discipline, dropout, and achievement data.

The evaluation team used the data above to address several evaluation questions that collectively assess school progress toward implementation of a functional 1:1 environment. Table 2 summarizes the alignment of the NCLTI project goals, evaluation questions, and data sources.

Table 2. Alignment of NC 1:1 LTI Project Goals, Evaluation Questions, and Data Sources.

<table>
<thead>
<tr>
<th>Project Goals</th>
<th>Evaluation Questions</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve school infrastructure and support systems to meet 21st century needs. (school level)</td>
<td>How have school infrastructures and support systems evolved to meet staff and student 21st century needs?</td>
<td>Policies/Procedures 1:1 Online Survey Focus Groups Site Visit Checklist Laptop Repair Checklist 1:1 PD Inventory/Quality</td>
</tr>
<tr>
<td>2. Improve staff attitudes and skills related to technology. (teacher level)</td>
<td>How have staff attitudes and skills changed over time?</td>
<td>Classroom Observations 1:1 Online Survey Focus Groups</td>
</tr>
</tbody>
</table>

1 Data collection tools, including surveys and focus group protocols, are provided in evaluation report appendices available at [http://www.fi.ncsu.edu/project/evaluation-of-nc-11-learning-initiative/publications](http://www.fi.ncsu.edu/project/evaluation-of-nc-11-learning-initiative/publications).
### Project Goals: Evaluation Questions: Data Sources

<table>
<thead>
<tr>
<th>Project Goals</th>
<th>Evaluation Questions</th>
<th>Data Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. <strong>Enhance instructional practices by facilitating teachers’ ability to infuse instructional technology into routine classroom pedagogy.</strong> (classroom level)</td>
<td>How have teachers’ instructional practices changed over time?</td>
<td>Classroom Observations</td>
</tr>
<tr>
<td></td>
<td>How have teachers’ instructional practices changed over time?</td>
<td>1:1 Online Survey</td>
</tr>
<tr>
<td></td>
<td>How have students’ 21st century skills changed over time?</td>
<td>Exemplary Lesson Plans</td>
</tr>
<tr>
<td></td>
<td>How have student learning and achievement in core academic subjects changed over time?</td>
<td>Focus Groups</td>
</tr>
<tr>
<td>4. <strong>Improve student learning.</strong> (student level)</td>
<td>How have students’ 21st century skills changed over time?</td>
<td>Classroom Observations</td>
</tr>
<tr>
<td></td>
<td>How have students’ 21st century skills changed over time?</td>
<td>1:1 Online Survey</td>
</tr>
<tr>
<td></td>
<td>How have student learning and achievement in core academic subjects changed over time?</td>
<td>Focus Groups</td>
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<td></td>
<td>How have student learning and achievement in core academic subjects changed over time?</td>
<td>EOCs</td>
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<td></td>
<td>How have student learning and achievement in core academic subjects changed over time?</td>
<td>Attendance</td>
</tr>
<tr>
<td></td>
<td>How have student learning and achievement in core academic subjects changed over time?</td>
<td>Discipline</td>
</tr>
</tbody>
</table>

These evaluation efforts have enabled the identification of several important critical issues areas for successful implementation of 1:1 learning environments: leadership, instructional practice, student learning outcomes, infrastructure, special populations, and quality of implementation. The remainder of this paper discusses in detail the role of ELL students in successful 1:1 schools.

### Data Collection

The data summarized in this critical issue paper were gathered from an online survey administered to students in 1:1 schools in September 2009 (fall 2009), and separate focus groups with administrators, teachers, and English Language Learners conducted in October 2009 (fall 2009). The online student survey included yes/no questions, Likert-style items, frequency scales, summated rating scales, and open-ended questions. In 2009 the research team added to the survey the question “Have you been identified as an English Language Learner?” which allowed data to be disaggregated for the ELL subgroup in fall 2009. In fall 2009, 442 of the 1977 students who completed the survey, a 22% of the total, were ELL students (see Table 3).

| Table 3. *Number and Percentage of ELL Students and Non-ELL in Student Samples.* |
|---------------------------------|------------|------------|
| ELL                             | 442        | 22         |
| Non-ELL                         | 1535       | 78         |
| Total                           | 1977       | 100        |

The focus group protocols conducted with administrators and teachers included a question addressing the impact of the 1:1 initiative on various areas related to the learning experience of ELL students. In addition, in fall 2009, a member of the evaluation team conducted a focus group with a group of ELL students in a school from Cohort C, which has a large ELL student population.

### Data Analysis

The authors calculated the percentage of a) affirmative responses for yes/no questions, b) agree and strongly agree combined responses for Likert-style items, c) weekly and daily combined responses for frequency scale items, and, d) “I can do it by myself” and “I can show someone how to do this” combined responses for summated rating scales. Responses to open-ended questions from the survey, as well as focus group data, were analyzed following a qualitative methodological approach. Open-ended responses, relatively short in length, were entered into an Excel worksheet, sorted, and reviewed to identify most frequently addressed themes. Focus groups were transcribed and saved as simple text files that were then imported into HyperResearch for analysis. Using HyperResearch the text files were coded according to themes identified in previous evaluations of the NC 1:1 Learning Technology Initiative (Corn, 2009).
Results

The results section, based on ELL students’ responses to the student survey and separate focus groups with administrators, teachers, and ELL students, is organized into three main sections: demographic characteristics, 1:1 and ELL students’ English skills development, and benefits of 1:1 to ELL students.

Demographic Characteristics

**Ethnicity.** Among ELL students, seventy-three percent identified themselves as either Black/African American or White/Caucasian and 17% identified themselves as Hispanic/Latino. Among non-ELL students, ten percent identified themselves as Hispanic/Latino.

**Grade level.** Sixty-one percent of ELL students were in grades 9\textsuperscript{th} and 10\textsuperscript{th}. While the percentage of non-ELL students per grade was similar across grades 9\textsuperscript{th}, 10\textsuperscript{th} and 11\textsuperscript{th}, and even increased slightly in grade 12\textsuperscript{th}, among ELL students it decreased as grade level increased. This is in line with North Carolina graduation data that show that the graduation rate of ELL students is below that of white students (NCDPI, 2007).

**Class grades.** The majority of ELL students (53\%) and non-ELL students (47\%) indicated they mostly received "Bs" in their schoolwork. A higher percentage of non-ELL students (35\%) than ELL students (20\%) reported receiving "As". Conversely, a larger proportion of ELL students (24\%) than non-ELL students (16\%) reported receiving "Cs".

**Parents’ education level.** According to students’ responses on the survey, non-ELL students’ parents/guardians completed a higher level of education than ELL students’ parents. Twenty percent of ELL students and 31\% of non-ELL students indicated their parents had attained a 4-Year College or Advanced Graduate Degree. Twenty-two percent of ELL students and 15\% of non-ELL students said their parents had completed a High School Degree or GED High School Equivalency. The most selected level of education was High School Diploma (ELL=28\%, non-ELL 23\%). However, twenty-five percent of ELL students and 19\% of non-ELL students said they did not know what highest degree their parents had attained.

**Access to technology at home.** Seventy-eight percent of ELL students and 87\% of non-ELL students indicated they had a non-school issued computer. Seventy percent of ELL students and 81\% of non-ELL students said they were able to access the Internet from home. When asked which kind of Internet connection they had at home, forty-seven percent of ELL students and 57\% of non-ELL students chose Cable/DSL (see Figure 2). Although the percentage of students who chose Dial-Up was very small, it was higher for ELL students. In contrast, the percentage of students with Cable/DSL Internet service was higher for non-ELL students. Thirty-four percent of ELL students and 27\% of non-ELL students selected “Not sure”.

Technology skills. The majority of ELL students (72%) and non-ELL students (79%) rated their skill level in the use of the laptop as Intermediate or Advanced; however, the percentage of students at each of those skill levels was higher among non-ELL students than among ELL students (see Figure 3).

When asked about their comfort level with skills using the laptop, a greater percentage of non-ELL students than ELL students reported comfort with technology skills. However, both groups expressed comfort with similar types of technology skills. They felt more comfortable creating a multimedia presentation, formatting a text document, editing digital images, and creating and editing graphs and charts; they felt less comfortable creating a podcast and writing a computer program (see Figure 4).
Figure 4. Percentage of 1:1 students in fall 2009 (ELL $n = 417$, non-ELL $n = 1494$) who indicated they could do each activity or could show someone how to do it.

Access to laptop at school. A goal of the 1:1 initiative was to provide a laptop to every student enrolled in the participating schools. However, there were students who did not receive laptops for diverse reasons. ELL students said the laptop insurance fee they had to pay to the school was the principal reason why they decided not to receive a laptop.

Enrollment in online courses. Although less than 25 percent of students reported having taken online courses through any of the three providers given (North Carolina Virtual Public Schools - NCVPS), North Carolina Learn and Earn Online, and Quest Academy), a higher percentage of ELL students than non-ELL students indicated they had taken classes online from each provider (see Figure 5).

Figure 5. Percentage of 1:1 students in fall 2009 (ELL $n = 442$, non-ELL $n = 1535$) who indicated they were taking online courses.

1:1 and ELL Students’ English Skills Development

Administrators, teachers, and ELL students described how ELL students were using their laptops to
improve their English skills. On the student survey, ELL students listed and described class activities involving the use of the laptops that helped them learn the most. During the focus groups, administrators, teachers and students discussed how the laptops were not only supporting ELL students in the development of their English skills but also in their learning of content across classes. One teacher, for example, referred to how the laptops allowed students to have a better visual representation of what they were learning:

[Teacher] One of the strategies with ELL students is using imagery and stuff like that...so if they’re able to access whatever we’re learning, there’s pictures, versus giving them a hard copy of the test, they can kind of look at that or they can cross-reference sites that we’re working with.

Other teachers noted that the laptops facilitate students’ access to resources in their native language that reinforce what students are learning in class and give them another avenue for understanding.

[Teacher] They have access to native language resources, because they can Google stuff in Spanish, they can read about the same stuff in the language that they can access.”

[Teacher] They know how to find things and get it into a language that they understand, like Spanish...with the laptops right there, they know how to get that information in their native language.

Listening. ELL students used the laptops as a tool to practice their listening skills. For example, they enjoyed using them to listen to music, podcasts, and watching videos/movies in English. They also used them to access materials containing spoken English or to create their own (e.g., videos, podcasts, newscasts, online radio stations) and to complete listening exercises. During a school visit, the researcher saw various ELL students in an ESL class using their laptops to complete listening exercises from a website aimed for ESL students.

[Teacher] I do know that our ESL teacher has given me some files to post to our school website, and they are things, for example, videos and podcasts that the ESL students have created to help them, he’ll video them, and they watch themselves, and hear how they’re speaking, and he uses that as a teaching tool.

[Teacher] There’s a program that I use, YourTeacher.com, for remediation, and they’re able to go back and kind of hear from another angle also, and then get extra practice, it’s really helped them, because they’re one of those, they’re those kinds of students that will go after it no matter what it takes... It gives them the opportunity to hear it.

Speaking. Among ELL students, the most common use of the laptop for English speaking skills development involved creating slide shows using Microsoft PowerPoint or Mac Keynote and making an oral presentation in front of the class. Students indicated that this process helped them to overcome the fear of talking to or speaking in front of other people:

[Student] We did a PowerPoint and presented it to class. It helped because you remember what you did your project on especially for a test and we got in front of the class to help people with fear of talking.

Reading. The most common use of the laptop for reading among ELL students was searching and reading information online. One student said, “I get on the Internet in the morning and read for 15-20 minutes.” Another added, “The online books have helped me read and find out about answers easier.”

Reading activities were often combined with writing activities. For instance, ELL students would research a topic online and then they would summarize their findings on a paper/report or a slide show:

[Student] During the process of finding/gathering information for the project I needed something
else than just a book so I more than likely needed to use the Internet and Microsoft Word to type all my information to make it faster.

Teachers indicated that the laptops included or provided access to tools that facilitated reading comprehension. They mentioned that as they read a text ELL students used their laptops to look up the meaning of new words or to translate segments of the text. Teachers also reported that the laptops allowed ELL students to access resources in their native language, which helped them to understand texts:

[Teacher] It’s so helpful that they can go through and use the translator, and the ESL teacher was saying that they’re reading things, and it’s so much easier to incorporate more things into one semester.
[Teacher] Our textbook has an entire Spanish version online, so if they want to read the story that we read in class completely in Spanish, and then it has an audio version, so there’s all of this textbook support that if you don’t have computers, you can’t access.
[Teacher] They had to translate a section of Romeo and Juliet, and [a student] asked if she could put it into the Spanish translator and then translate it back to English, so that she could understand what was going on in Spanish before she put it in English.

**Writing.** The two most common writing activities ELL students did on their laptops were taking notes and writing essays. However, they also used them to create a variety of written products, including: journals, reflections, letters, a newspaper article, a poster, a brochure, a comic strip, a blog, and a webpage.

[Student] I had to make a PowerPoint on the major events in my life. Then I had to write an autobiography on my life. That taught me how to write a proper essay.
[Student] We are doing a Definition Essay (five paragraphs) on the term hero.

Seventy percent of ELL students agreed that they were more likely to revise/edit their work when they did it on their laptop. Some ELL students mentioned that the spelling and grammar-checking features in word processors were very useful for them as they wrote on their laptops. A teacher commented that the software tools on ELL students’ laptops assisted ELL students to become more aware of their own mistakes and to concentrate on more advanced features of the English language.

[Teacher] I also think because so many of the programs do prompt them to correct the language, they start to see the patterns of expression and how they’re going to catch the errors that they’re making all of the time because [Microsoft] Word keeps prompting them to, so it kind of gives them a way to hone in on, “Okay, I’m doing this wrong,” and then they can ask the question, “What is right? How do I get that to be right?”

**Vocabulary.** Teachers and students agreed that the laptops made learning vocabulary easier. Although they described very few class activities explicitly aimed to learning vocabulary, ELL students said they used their laptops to go online and search the meaning of new words or phrases using electronic dictionaries or search engines, to access subject-specific dictionaries online, to create a class dictionary in Biology, and to create a PowerPoint slide show with vocabulary words in Foods class. The fact that students listed few vocabulary activities could suggest that vocabulary learning is being neglected, however, it is likely that it is just being integrated into other class activities.

[Student] Sometimes you don’t know a word, and the teacher uses it, or even if you know it, you don’t know what the teacher is saying, you can go online, type that sentence in, and get, because you’re always going to have your computer.
[Student] When we have vocabulary, we… play games with it. I got that from English 1. It’s fun, it’s really fun.

**Skill integration.** The most common laptop activities ELL students did included creating a written product, doing research online, or creating a multimedia project. It was often the case that an activity focused on a particular language skill but it also integrated other language skills. For example, an activity may have involved students using the laptop to research a topic on the Internet, summarize the research findings on a PowerPoint slide show, and make an oral presentation in front of the class. Many students described activities like these:

[Student] I had to write a four page paper about drunk driving and a ten minute presentation about it. I had to research the topic with the Internet.
[Student] We learned about the Salem Witch trails and we searched about communism and puritanism. We used iMovie and Keynote to communicate our ideas in a more interactive and visual way other than just simple notes.

When ELL students described laptop activities or projects they had done that had helped them learn the most, they did not include any activity done in an English as a Second Language class. They described, or listed, activities in Art, Biology, Civics, Computer Applications, Drama, Electronics, English, Foods, French, German, Graduation Project, Health Team Relations, History, Mathematics, Science, Spanish, and World History classes. This may suggest that for those students English skills development is being integrated in content classes and/or content teachers are using the laptops more effectively than ESL teachers to engage students.

In response to a question regarding how often they used the laptops in English/Language Arts, Math/Algebra, Science, History/Social Studies, Foreign Language, college courses, and electives, more than 40% of ELL students, as well as non-ELL students, said they had used the laptops at least weekly in each of those classes (see Figure 6). They used the laptops more frequently in English Language/Arts, Science, History/Social Studies and less frequently in Math/Algebra and college courses. When the responses of ELL students were compared to those of non-ELL students, the proportion of students who said they used their laptops at least weekly in each was higher among non-ELL students.

![Figure 6. Percentage of 1:1 students (ELL n = 417, non-ELL n = 1494) who indicated having used the laptop at least weekly in each class. Percentages represent only students taking each class during the current term (see Appendix).](image)
Popular uses of the laptops by ELL students across classes included researching topics and then using iMovie and Keynote to present the information in English, creating “Comic Life projects to show how to do Math problems,” and making an ecology dictionary in Science. ELL students gave examples of how they used the laptops across classes:

[Student] For…World History, you can find some character or something and you have information on issues...you can look at the PowerPoint [slide show]. Like Math, too, you don’t have to have a calculator around, you can just have the computer…. It’s much better, because it has more stuff than the calculator has.

[Student] This year in my Electronics I class, our teacher made us make a movie on Windows Movie Maker with all of the schematic tool symbols.

[Student] I did a project in civics that helped me understand more about the government. I used my computer by researching the information.

[Student] We did a project in science; we had to go on the Internet and look up facts.

**Benefits of 1:1 to ELL Students**

Administrators, teachers, and ELL students in the 1:1 schools identified several benefits the laptops brought to ELL students, including equity, increased engagement and motivation, increased self-confidence, development of 21st century skills, increased communication, increased access to technology at home, and increased parental involvement.

**Equity.** According to administrators and teachers, laptops provided ELL students with equal access to resources as non-ELL students, thus leveling the playing field for ELL students.

[Administrator] [The laptop] put them on a little bit of a level footing with their peers, because a lot of those kids don’t have access to it at home, and I think it’s put them on a little bit of a more equal playing field.

[Teacher] It gives them that sense of ownership and accountability as well, and they feel they’re at the same level as other student[s].

[Student] In my civics class we searched on the Internet for a project we did and it really helped not having to go to the library or share someone else's computer.

**Engagement and motivation.** Students felt that the laptops increased their engagement and motivation in school. Similar percentages of ELL students and non-ELL students agreed with each of four statements about their level of engagement and motivation in school when they used their laptops (see Figure 9). Between fifty and sixty percent said they were more interested in school, were more involved in school, and enjoyed school more (see Figure 7). An even larger proportion of students, between 60% and 70%, agreed that the laptops would help them get a better job; however, this percentage was larger for non-ELL students. This could suggest that ELL students believe that their ELL condition places them at a disadvantage in regard to future job prospects.
Figure 7. Percentage of 1:1 students in fall 2009 (ELL $n = 417$, non-ELL $n = 1494$) who indicated agreement with various statements pertaining to engagement and motivation.

**Self-confidence.** Administrators, teachers, and students also felt that the laptops helped students to be more self-confident and to interact with others in school:

[Administrator] I think it’s helped them be more self-confident that they don’t have to hold their head down, or they don’t have to take a back seat to somebody, so I think from that standpoint it’s been real beneficial, and I think that translates into more success because they’re more self-confident.

[Student] I had to do an iMovie for biology class and I didn't know what I was doing so I figured it out.

[Student] It's a great help to connect to our social and educational life on campus.

This enhanced confidence stems from their ability to feel in control of their own learning. By using technology to break down communication barriers, ELLs are developing a sense of belonging within the school environment.

**21st century skills.** Students indicated the laptops have helped them develop 21st century skills, primarily technology literacy and information literacy (see Figure 8). One ELL commented, “I cannot name just one [class] project that helped me become more literate in technology. We constantly learn how to do all sorts of things on the laptops.” The percentage of students who perceived such benefits in most of the skills, especially in those with a social focus, was higher for ELL learners. Multiple factors could help explain this difference, such as the multicultural upbringing of ELL students, their interactions with diverse individuals in their local community, and their interactions at school with other ELL students who come from various cultures or countries.
Figure 8. Percentage of 1:1 students in fall 2009 (ELL $n = 417$, non-ELL $n = 1473$) who indicated agreement with various statements pertaining to 1:1 computing and 21st century skills.

**Communication.** Students were asked to indicate how often they used the laptops provided by the 1:1 initiative for one-way and two-way communication. ELL students and non-ELL students reported using the laptop with similar frequency; however, a larger percentage of ELL students than non-ELL students agreed that they interacted more with their teachers when students used their laptops. An administrator pointed out that the laptops allowed ELL students to satisfy traditional class assignments in a more comfortable way:

[Administrator] They can create some multimedia projects and communicate in a way that makes them feel so much more comfortable than having to stand up and present… I went in our ESL class the other day, and it was an iMovie, and the kid had done a voiceover, it was awesome, but he would have probably felt very uncomfortable standing in front of the class and doing that sort of thing.

**Access to technology at home.** Almost all students, including ELL students and non-ELL students, were allowed to take laptops home, where they used them primarily to complete homework, organize information, locate educational resources on the Internet, and e-mail. They used the laptops less often for instant messaging and to do drills (see Figure 9). Although ELL students and non-ELL students used the laptops for the same activities at home, a larger percentage of ELL students than non-ELL students used them to complete homework, for instant messaging, and to do drills. This may, at least in part, suggest that ELL students were still working on developing their English skills through the completion of drill-and-practice exercises that incorporated the use of the laptops.
Parental involvement. School leaders in the 1:1 school noted that the 1:1 initiative increased parental involvement in their children’s education.

[Administrator] Even for their parents it’s something new for them, it’s education that they can share and, unfortunately all too often in some homes, the parent, especially with those learners and those students, it’s not a shared entity, it’s “This is your job, and my job is in the home,” and I think for some of them it’s engaged the parents a little bit and maybe made their schooling a little more important to some extent to their family.

[Administrator] And it’s also helpful for parents, we put the translation fish up on our webpage, and we gave them a way to translate, so it’s really helpful when dealing with parents who are very limited English, even though their children may be fluent, so I know that Spanish-speaking parents can still check my webpage.

In addition, ELL students’ comments suggest that various laptop activities students did in class impacted them in multiple ways, including a) improving their organization and time management skills, b) improving their efficiency and quality of work, c) improving their typing skills, d) improving their understanding and learning of class content, e) appealing better to their learning styles, f) facilitating more opportunities for cooperation, and g) helping them to get better grades (see Table 4).

Table 4. Additional Benefits of Laptops Suggested by ELL Students in their Descriptions of Class Activities.

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved organization and time management skills</td>
<td>[Student] In Health Team Relations we had to do a career project. I used Microsoft PowerPoint to do my project. The PowerPoint [presentation] helped me organize my information and graphics. [Student] It has helped me find some good sites to get information sites to go to so that I can finish up the task before due date.</td>
</tr>
<tr>
<td>Improved efficiency and quality of work</td>
<td>[Student] The use of my laptop whenever I need it has helped me do my work faster and better. [Student] I have had to use a new program called MathType for math projects</td>
</tr>
</tbody>
</table>
and I think it makes it a lot easier to do math problems and put them in Pages and Keynote and stuff.

**Improved typing skills**

[Student] We had to write about a memory we will never forget and I learned how to type faster.

**Improved understanding and learning of class content**

[Student] In German 2 class we had to do a keynote or iMovie or whatever you wanted on music artists and I did one on Beethoven and I learned a whole lot about him and his life.

[Student] I did a project on Adolf Hitler and the Holocaust for English it helped me learn even more about it.

[Student] In Algebra 1 we went to a website and it help us master some math skills that we have worked on.

**Appealed to different learning styles**

[Student] I had to complete a worksheet on Biology and get on a website. The website really helped me because I am a visual person and we had to watch videos and answer to questions on the worksheet.

**Facilitated more opportunities for cooperation**

In Mrs. [name] class the group had to go online to get pictures and information on a specific topic. We also had to design a PowerPoint presentation… and print graphics off to put on our poster board.

**Contributed to getting better grades**

[Student] This year in my Electronics I class, our teacher made us make a Movie on Windows Movie Maker with all of the Schematic Tool Symbols. Making the movie on Movie Maker helped me study for our test and I passed it.

[Student] [The activity] helped me get better grades.

**Discussion**

The purpose of this critical issue paper was to explore the impact of the NC 1:1 Learning Technology Initiative on various areas of the learning experience of English Language Learners. The findings of this study suggest that ELL students have a disadvantage in various areas that have a direct or indirect impact on their educational experience at school. ELL students reported receiving lower grades than non-ELL students at school, which is in line with previous research that shows that ELL students are less likely than non-ELL students to succeed in school (Alliance for Excellence in Education, 2007). They also reported having parents with a lower education level than their non-ELL counterparts. The proportion of students at higher grade levels was also smaller for ELL students than for non-ELL students, suggesting that ELL students are dropping out of high school in larger proportions than white students (NCDPI, 2007). In addition, ELL students indicated they had less access to computers and the Internet at home, which places them at a disadvantage in regard to access to educational resources.

By providing every student a laptop they could take home, the 1:1 initiative has helped to narrow the access gap between ELL students and non-ELL students. Administrators, teachers, and ELL students agreed that ELL students were using the laptops as much as, and sometimes more than, non-ELL students in a variety of class activities. They also believed that the laptops had positively impacted ELL students’ access to technology at school and at home, engagement and motivation, self-confidence, 21st century skills, communication, and parental involvement.

Two additional findings of this study may need further consideration by educators and researchers. First, administrators, teachers, and ELL students agreed that ELL students enjoyed having the laptops and that they were using them in class; however, ELL students used the laptops primarily to write and to search...
for information online. Teachers and students mentioned only a few activities in which they had used the laptop in more innovative ways (e.g., using Web 2.0 tools). Future research should explore this issue in more detail to find out whether it relates to teacher’s ability to integrate the laptops or whether it is related to the availability of Web 2.0 resources targeted at ELL students. Second, data published by the North Carolina Department of Public Instruction show that the majority of ELL students in NC’s public schools are Hispanic, however, most ELL students in this study identified themselves as African-American or White, even though Hispanic/Latino was provided as a response choice. This issue around racial and ethnic identification for ELL students warrants further consideration in future studies and by everyone involved in the education of ELL students.
References


Appendix

Number of students taking each class in fall 2009

<table>
<thead>
<tr>
<th>Class</th>
<th>ELL (n = 417)</th>
<th>Non-ELL (n = 1494)</th>
<th>ELL %</th>
<th>Non-ELL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>English/Language Arts</td>
<td>287</td>
<td>902</td>
<td>72%</td>
<td>79%</td>
</tr>
<tr>
<td>Math/Algebra</td>
<td>286</td>
<td>915</td>
<td>48%</td>
<td>49%</td>
</tr>
<tr>
<td>Science</td>
<td>247</td>
<td>828</td>
<td>62%</td>
<td>78%</td>
</tr>
<tr>
<td>History/Social Studies</td>
<td>227</td>
<td>794</td>
<td>68%</td>
<td>79%</td>
</tr>
<tr>
<td>Foreign Language</td>
<td>158</td>
<td>469</td>
<td>59%</td>
<td>64%</td>
</tr>
<tr>
<td>College Courses</td>
<td>119</td>
<td>356</td>
<td>44%</td>
<td>59%</td>
</tr>
<tr>
<td>Electives</td>
<td>284</td>
<td>1093</td>
<td>59%</td>
<td>63%</td>
</tr>
</tbody>
</table>