

GOING ONE-TO-ONE IN URBAN SCHOOLS:

An Evaluation of the XO Champions Initiative in Project LIFT Elementary Schools

Prepared by Research for Action • January 30, 2015

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About Research for Action

Research for Action (RFA) is a Philadelphia-based nonprofit organization. We seek to use research as the basis for the improvement of educational opportunities and outcomes for traditionally underserved students. Our work is designed to: strengthen public schools and postsecondary institutions; provide research-based recommendations to policymakers, practitioners, and the public at the local, state, and national levels; and enrich the civic and community dialogue about public education. For more information, please visit our website at www.researchforaction.org.

Acknowledgements

This research would not have been possible without the generous support of the John S. and James L. Knight Foundation. We are also very appreciative of the time and efforts of the principals, technology facilitators, teachers, and parents who graciously gave their time and openly shared their successes and challenges with the XO Champions initiative. We are especially grateful to two individuals who provided support throughout the project, including assistance with data collection on the ground in Charlotte: David Jessup, Executive Director of Digi-Bridge, who conducted the classroom observations; and Beth Marshall, who conducted both the classroom observations and moderated the parent focus groups.

In addition to the authors of this report, a team of RFA staff was instrumental in guiding the project. Our dedicated intern, Stefanie Colino, assisted with both the quantitative and qualitative aspects of the study, assisting with instrument creation, data collection, analysis, and writing. RFA's Executive Director, Kate Shaw, Deputy Director, Stephanie Levin, and Director of Qualitative Research, Liza Rodriguez, provided guidance and insight throughout all phases of the research process. Finally, our Communications Director, Alison Murawski, and our Graphics Designer/Communications Assistant, Rachel Greene, coordinated many aspects of report production.

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Glossary of Terms

Glossary of Terms

Project LIFT: Turnaround initiative encompassing nine low-performing public schools in the West Charlotte Corridor through a five-year, public-private partnership between Charlotte-Mecklenburg Schools and local philanthropic and business communities in Charlotte.

XO Champions Initiative: A one-to-one laptop initiative within Project LIFT that distributed XO laptops to students across all seven Project LIFT elementary schools.

XO Laptop: Laptop designed by One Laptop Per Child to be “rugged, low-cost, low-power,” child-friendly, and connect to the Internet.

Activities: Pre-programmed software applications that operate on XO Laptops.

Digi-Bridge: The non-profit organization overseeing implementation of the XO Champions Initiative.

One Laptop Per Child: The non-profit organization that developed and distributed the XO Laptop and associated Activities.



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Executive Summary

Introduction

Beginning in spring 2013, students in seven elementary schools throughout the Project LIFT zone in Charlotte, North Carolina began to receive XO laptops provided by the organization One Laptop Per Child (OLPC) for use both within their classroom and at home. This report details Research for Action's (RFA) mixed-method evaluation of the first year and a half of the implementation of this initiative, including data from the 2012-13 and 2013-14 school years. We provide descriptive information on how often and for what purposes teachers and students used their XO laptops, as well as analyze successes and challenges with XO laptop integration.

Professional Development Offerings for XO Champions

CMS Tools: Teachers had access to optional CMS tools and professional development trainings, some of which touched on technology integration.

OLPC/Digi-Bridge: During the 2012-2013 academic year, all XO Champion teachers attended a mandatory two-day teacher training. Additionally, OLPC sponsored monthly professional development sessions at each of the school locations. These sessions were open to all Project LIFT personnel. Facilitators also offered school-based, ongoing trainings responsive to the needs of their community, and these trainings were supported with funds from OLPC. In the second year, OLPC offered two optional teacher trainings at the beginning of year. OLPC also provided training at two learning community professional development days and at all of the learning community's evening professional development sessions. When Digi-Bridge began providing consultancy in April of 2014, professional development at each school site continued.

ISTE Tools: A select number of teacher leaders (5) were sponsored by Digi-Bridge to attend the annual International Society of Technology in Education (ISTE) conference. Upon return, these teachers were charged with leading a professional development session on the ISTE tools.

This report identifies the conditions that impacted, both positively and negatively, XO Champions integration efforts in the seven LIFT elementary schools. Beginning in the 2014-15 school year, Project LIFT began to move away from XO Champions as its primary technology solution. However, the lessons learned from the project are applicable to LIFT schools (that still use the XO laptops), and are relevant to a broad set of policymakers and education leaders who are considering implementing similar one-to-one initiatives in their schools or districts.

Key Findings

Our descriptive analyses of XO laptop use indicated:

1. Students and teachers used the laptops, on average, for one lesson per day;
2. Within schools, usage of XO laptops differed by grade level – lower grades reported using the laptops more frequently than did upper grades;
3. Internet-centric activities were the primary focus of XO laptop classroom usage; and
4. Students brought their XO laptops home infrequently, resulting in minimal XO laptop use at home.

Our analysis also revealed a number of important implementation successes and challenges in student use, teacher use, and school supports. The most notable of these are highlighted in Table ES1, organized by students, teachers, and the school as a whole. Included in the student use section is our examination of the relationship between XO laptop usage and both student academic outcomes and student behavioral incidences, respectively.

Table ES1. Successes/Challenges in Student Use, Teacher Use, and School Supports

SUCSESSES		CHALLENGES	
STUDENT	<ul style="list-style-type: none"> - Students enjoyed using the XO laptops, found them intuitive - Students felt responsible for the XO laptops 	<ul style="list-style-type: none"> - Students became frustrated when the laptops did not function well. (Internet connectivity, broken “ears”) - Home use of laptops was minimal 	
TEACHER	<ul style="list-style-type: none"> - Teachers became more comfortable and more proficient with the technology over time 	<ul style="list-style-type: none"> - Hardware problems and XO design problems negatively influenced teachers’ perceptions of the initiative - XO laptop use was not critical to teachers’ lessons 	
SCHOOL SUPPORT	<ul style="list-style-type: none"> - School staff liked the XO Champion initiative’s model of support and having access to classroom technology tools - Technology facilitators felt they had adequate support 	<ul style="list-style-type: none"> - Technology problems (repairs and upgrades, Internet connectivity) caused frustration across the school - Some teachers frustrated by the lack of professional development opportunities and quality tools - Parents felt unsupported using XO laptops at home 	
Student Academic Outcomes			
<ul style="list-style-type: none"> - A slightly positive or neutral relationship exists between access to XO laptops and student outcomes. 			
Student Behavioral Outcomes			
<ul style="list-style-type: none"> - Classrooms where teachers reported higher than average use of XO laptops had fewer student behavioral infractions. 			

Recommendations

Our study findings suggest that schools and districts seeking to implement a one-to-one technology initiative should develop a comprehensive technology plan prior to deployment. The plan should include:

- A needs assessment of current technological infrastructure and existing technology devices;
- Established expectations and goals for usage, including targeted age groups or subjects, as well as expectations around use of the laptops at home; and
- A defined system of support for teachers, including both professional development and technology device support.



Going One-to-One in Urban Schools: An Evaluation of the XO Champions Initiative in Project LIFT Elementary Schools

I. Overview

In the spring of 2013, students across seven Project LIFT elementary schools in the Charlotte-Mecklenburg Schools (CMS) began to receive personal XO laptops as part of the XO Champions one-to-one laptop initiative. Project LIFT designed the initiative to increase access for students and their families, and train educators to ensure the strategic use of technology. Specifically, the technology focus area of Project LIFT was intended to improve student engagement in school and, by extension, contribute to regular attendance and improvements in behavior and academic proficiency.

In this evaluation, Research for Action (RFA) examines the initial implementation of the XO Champions initiative, using data from the 2012-13 and 2013-14 school years. We provide descriptive information on how often and for what purposes teachers and students used their XO laptops, as well as analyze successes and challenges with XO laptop integration.

This report is intended as a resource to assist the Knight Foundation and Project LIFT administrators in understanding the conditions that impacted, both positively and negatively, XO Champions integration efforts in the seven LIFT elementary schools. Beginning in the 2014-15 school year, Project LIFT began to move away from XO Champions as its primary technology solution. However, the lessons learned from the project are applicable to LIFT schools (that are still using the XOs), and are relevant to a broad set of policymakers and education leaders who are considering implementing similar initiatives in their schools or districts.

A. Structure of the Report

The report is organized in four sections:

1. Overview of the study, including research questions and methodology;
2. Frequency and focus of XO laptop use;
3. Findings in the following areas:


- a. *Student XO laptop experiences and outcomes*, including students' and parents' perceptions of XO laptops and an analysis of students' academic and behavioral performance;
 - b. *Teacher XO laptop use*, including teachers' perceptions of XO laptops, teachers' integration of XO laptops into their lessons, and teachers' levels of comfort and proficiency in using technology;
 - c. *School supports for XO laptop use*, including technical challenges related to implementation;
4. Discussion and recommendations related to the implementation of XO Champions and other one-to-one laptop initiatives.

XO Champions Background

Project LIFT schools received their XO laptops as part of a larger initiative called “XO Champions.” The initiative had two main components: 1) The distribution of the XO laptops to students in grades 1-5 in Project LIFT elementary schools; and, 2) A system of support and technical assistance for XO laptop integration. See Figure 1 for more information.

Figure 1. About XO Laptops

What are XO Laptops?

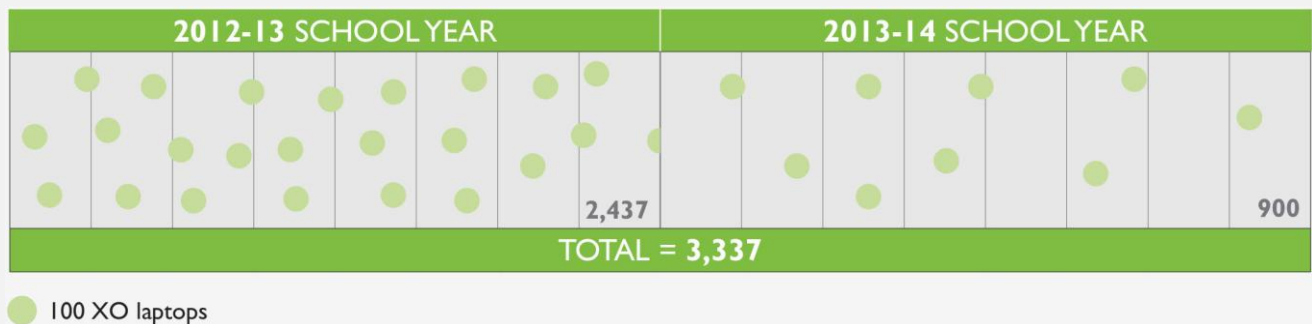


XO laptops were created by **One Laptop Per Child (OLPC)** for distribution to underserved children across a broad range of educational settings. Accordingly, the XO laptops were designed as a “rugged, low-cost, low-power, connected laptop.” Due to their green color, students and teachers in **Project LIFT** schools often referred to the XO laptops as the “green machines.” The specific models used by Project LIFT students was the XO 1.75.

The XO laptops have their own operating system (i.e. different from Microsoft or Apple systems) which features various applications that are called “Activities.” Activities include applications for word processing, Internet browsing, spreadsheet creation, and as well as educational applications and games. For more specific information on the Activities most frequently used by Project LIFT students and teachers, see Figure 4. As part of the XO Champions initiative, teachers were asked to embed the laptops into their instructional practice, and children were, in some cases, allowed to take their laptops home with them.

The majority of XO laptops were distributed in Spring of 2013, with 2,437 machines deployed to grades 1-4 across the seven schools.¹ In the 2013-2014 academic year, 900 additional machines were delivered, spreading usage to the remaining grades and classrooms and replacing broken laptops from the spring. Project LIFT was responsible for determining how machines were distributed. The two-staged rollout was due to the availability of the XO laptops. Figure 2 displays a timeline of laptop disbursement.

Figure 2. XO Disbursement Timeline



Each of the seven LIFT elementary schools also hired a “technology facilitator” to guide the integration of the XO laptops into school culture and practice.

Additional support came from the Project LIFT partner responsible for technology integration assistance. The XO Champions initiative was first administered by the non-profit LIFT partner One Laptop Per Child (OLPC). When OLPC shifted its focus on XOs to a marketing and device approach, the education integration contract was transferred to a new non-profit LIFT partner, Digi-Bridge. Digi-Bridge became responsible for overseeing the distribution of XO laptops, training for technology facilitators, as well as providing technical assistance and laptop repair.

¹ Laptops were deployed to Ashley Park 5th graders in Spring 2013; Kindergarteners at this school also received laptops the following fall.

B. Scope of Our Study




Our mixed-methods study of the XO Champions initiative examines the frequency and focus of XO laptop use, elements of program quality, and impact on student outcomes. Our evaluation is guided by two main questions:

1. How do Project LIFT student and teachers use XO laptops?
2. How does XO laptop use affect student academic outcomes?

Research Questions

To address these questions, we provide descriptive data about the frequency and focus with which students and teachers used the XO laptops both inside and outside the classroom. We then examine the implementation of the XO Champions initiative at the student, teacher, and school levels. Included in the student focus area is an examination of the relationship between XO laptop use and student academic and behavioral outcomes. Table 1 shows specific research questions in each area.²

Table 1. Research Questions by Level of Focus

FOCUS AREA	RESEARCH QUESTIONS
 STUDENTS	<ul style="list-style-type: none"> - How much time do students spend on their laptops, both during the school day and at home? - How do students use their XO laptops, both for academic and non-academic purposes? - How does the XO Champions initiative influence students in non-academic measures, such as self-confidence, motivation, and attendance? - What is the relationship between the XO Champions initiative implementation and student academic outcomes?
 TEACHERS	<ul style="list-style-type: none"> - How often and in what ways do teachers use XO laptops as an instructional tool? - How do teachers use XO laptops as a tool for configuring their classrooms (e.g. differentiated instruction, small group work) - How do teachers perceive the success of the XO Champions initiative?
 SCHOOL SUPPORTS	<ul style="list-style-type: none"> - What forms of professional development do teachers receive on XO laptop integration? - What is the nature of the interaction between teachers and technology facilitators? - What have been the successes and challenges related to the implementation of the XO Champions initiative?
HOME USE	<ul style="list-style-type: none"> - What types of interactions do parents and other family members have with the XO Champions initiative?

Data Sources

As outlined in Table 2, the study includes qualitative and quantitative data from parents and school staff, including principals, technology facilitators, parents, and teachers.

² Research questions were refined over time and reflect emerging data in each focus area.

Qualitative data includes interviews, focus groups, classroom observations, and document review. Quantitative data were collected using teacher surveys and students' academic and behavior records. The teacher survey was designed to capture teachers' perceptions and utilization of XO laptops over the course of the 2013-14 school year. The web-based survey was administered in June 2014 to the teachers who received XO laptops as early as spring 2013 and as late as spring 2014. Responses were received from 51/104 teachers, yielding a 49% response rate. Respondents were representative of all seven Project LIFT elementary schools participating in the XO Champions initiative. For more information on data collection, including survey development and administration, as well as the limitations in sampling methodologies, see Appendix A.

Table 2. Study Data Sources and Response Rates

	DESCRIPTION
INTERVIEWS	
Technology Facilitators (6) – Spring 2014	One-on-one telephone interviews with each technology facilitator. One technology facilitator was on maternity leave and not available for an interview.
Principals (7) – Spring 2014	One-on-one telephone interviews with each principal. These interviews were part of the larger external evaluation for Project LIFT
FOCUS GROUPS	
XO Champions Parent Focus Groups (3) – Summer 2014	Three separate focus groups of 8-14 Project LIFT parents conducted during a Project LIFT community event by a Research for Action contractor. The focus groups were a convenience sample of parents from Bruns Academy, Druid Hills Academy, Thomasboro Academy, and Walter G. Byers School.
OBSERVATIONS	
K-5th Grade Classrooms (30) – Spring 2014	30-45 minute K-5 classroom observations conducted at all XO Champion schools by two Digi-Bridge associates. Observers completed an observation protocol developed by Research for Action.
DOCUMENT REVIEW	
Memorandum of Understanding with LIFT, Digi-Bridge, OLPC website – Ongoing	Analysis of documents related to OLPC and Digi-Bridge's respective provision of services and information regarding XO laptop hardware and software.
SURVEY	
Teachers (51; 49% response rate) – Summer 2014	Online survey sent to all teachers who received XO laptops. 77 possible questions.
STUDENT RECORDS	
Student-level data including attendance, behavioral, and academic information	Student-level data were collected as part of the larger external evaluation for Project LIFT. Data were provided by the Charlotte-Mecklenburg School district.






C. Key Findings

Our analyses of the frequency and focus of XO laptop usage reveal the following findings:

- On average, students and teachers used the laptops for about one lesson per day;
- XO laptops use varied within schools by grade level;
- Classroom usage of XO laptops focused on Internet-based activities; and
- Home use of XO laptops was minimal, as students did not regularly bring their laptops home.

Our analysis also identifies important implementation successes and challenges for stakeholders across the LIFT schools. The most notable of these are listed in Table 3, organized by students, teachers, and the school as a whole.

Table 3. Successes/Challenges in Student Use, Teacher Use, and School Supports

	SUCCESSES 	CHALLENGES 
 STUDENT	<ul style="list-style-type: none"> - Students enjoyed using the XO laptops, found them intuitive - Students felt responsible for the XO laptops 	<ul style="list-style-type: none"> - Students became frustrated when the laptops did not function well. (Internet connectivity, broken “ears”) - Home use of laptops was minimal
 TEACHER	<ul style="list-style-type: none"> - Teachers became more comfortable and more proficient with the technology over time 	<ul style="list-style-type: none"> - Hardware problems and XO design problems negatively influenced teachers’ perceptions of the initiative - XO laptop use was not critical to teachers’ lessons
 SCHOOL SUPPORT	<ul style="list-style-type: none"> - School staff liked the XO Champion initiative’s model of support and having access to classroom technology tools - Technology facilitators felt they had adequate support 	<ul style="list-style-type: none"> - Technology problems (repairs and upgrades, Internet connectivity) caused frustration across the school - Some teachers frustrated by the lack of professional development opportunities and quality tools - Parents felt unsupported using XO laptops at home
Student Academic Outcomes		
<ul style="list-style-type: none"> - A slightly positive or neutral relationship exists between access to XO laptops and student outcomes. 		
Student Behavioral Outcomes		
<ul style="list-style-type: none"> - Classrooms where teachers reported higher than average use of XO laptops had fewer student behavioral infractions. 		

We explain our findings in greater detail in the following sections.

II. Findings

A. Frequency and Focus of XO Laptop Use

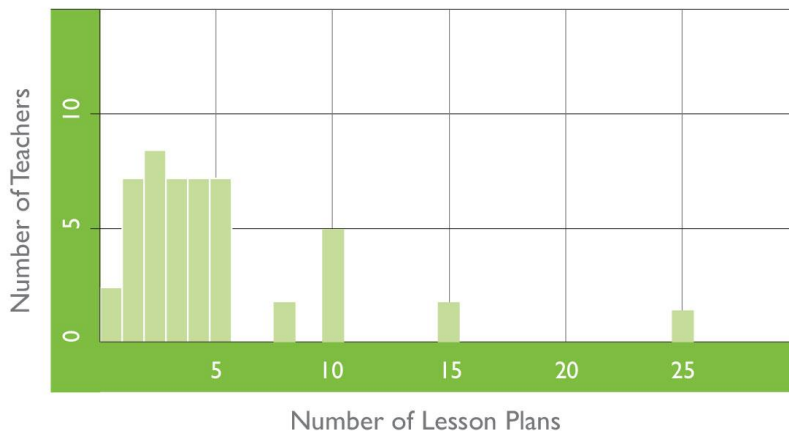
The XO Champions program is based on the assumption that distributing the XO laptops on a one-to-one basis to students would provide students and teachers alike with consistent and reliable access to the laptops as a learning tool. In this section we examine data from the teacher survey and a host of qualitative sources to determine both the *frequency* of XO laptop use and the *focus* of laptop use in practice.³

Frequency of XO Laptop Use

While teachers across the seven LIFT elementary schools were encouraged to use the XO laptops in their classrooms, there were no specific guidelines about how often teachers were expected to employ them. Accordingly, a key question of interest is: How much time did teachers dedicate to using XO laptops in the classroom as an instructional tool? We found that, on average, the frequency of use across schools was fairly consistent, but use varied quite a bit within schools. Part of this within-school variation may be attributable to grade level differences. Qualitative evidence suggests that younger students used the laptops more frequently than did older students, and some of this variation may be attributable to competing technology devices in the schools. Additionally, interviews with technology facilitators and focus groups with parents shed light on the amount of time that students used the XO laptops outside of school.

On average, students and teachers across the seven elementary schools used the laptops for about one lesson⁴ per day. Later in this report (see page 10), we present findings on how teachers used the laptops as instructional tools in their classrooms. Here, however, we focus on the frequency of laptop use in the classroom. Teachers reported that students used XO laptops an average of six lessons per week, or slightly more than one lesson per day (see Figure 3).

Figure 3. Teachers' Reported Number of Lessons per Week Using XO Laptops



³ We define “frequency” as the number of lessons that teachers dedicated to using XO laptops in their classrooms and “focus” as the Activities and related academic content for which teachers and students used the XOs.

⁴ The survey defined “one lesson” as “a period of time that [a teacher] devote[s] to one subject area or topic in the classroom.”

As shown above, the survey data includes several outliers; two surveyed teachers reported that students never used XO laptops, and two teachers reported that students used laptops 15-25 times per week. A strong majority of teacher survey respondents (84%, n=50) indicated that their students used an XO laptop for five or fewer lessons per week.

XO laptop use varied within schools, both by grade level and by students' ability to access competing technology. Although XO laptop use appeared to be fairly consistent in most schools, the data show variation in laptop use within the schools. Specifically, XO laptop frequency of use varied by grade level and the degree to which students had access to competing technology.

Grade Level Differences: Interviews with technology facilitators and parents reveal that students in lower grades (1st-3rd) used the XOs more frequently on average than did students in upper grades (4th-5th). One explanation that some parents and technology facilitators provided regarding these differences was that the XO laptop's appearance appealed to younger students, but not to older students. One technology facilitator stated, "The [older] kids prefer a nice shiny thing as opposed to something that looked like a LeapFrog⁵ laptop that the Kindergarteners had."

Competing Technology: Another possible explanation for within-school variation in laptop use was the presence of competing technology in many of the schools. Technology facilitators acknowledged that the presence of iPads or Chromebook laptops may have contributed to students' usage trends with the XO laptops. All LIFT elementary schools had at least some access to other technology devices, although the distribution within each school varied. In the teacher survey, a majority of teachers (75%, n=38) reported using both XO laptops and other technology devices for classroom instruction. Data from classroom observations confirmed these findings. One third of the 30 classrooms observed did not use the XO laptops in their instruction during the observation period, but did use other technology, such as Chromebooks, iPads, or projectors.

These two sources of within-school variation may be related. In some cases, technology facilitators reported that, when given the choice between XOs and other technology (e.g., tablets and laptops), older students were more likely than younger students to prefer other technologies. Students likely also followed suit from their teachers; when teachers in the upper grades preferred to use competing technology, students were less likely to use the XO laptops in those classrooms.

Home use of XO laptops was minimal, as students did not regularly bring their laptops home. The XO laptops were designed as rugged machines, capable of surviving the trip between home and school. In fact, home use of the XO laptops was aligned to a major goal outlined in Project LIFT's strategic plan,⁶ namely increasing access to technology at home for LIFT students. However, most parents who participated in focus groups reported that their children were not bringing their laptops home, and that they were unsure of the schools' expectations for the frequency of laptop usage at home.

⁵ LeapFrog is a company that produces educational devices such as tablets and laptops marketed towards children under 10 years old.

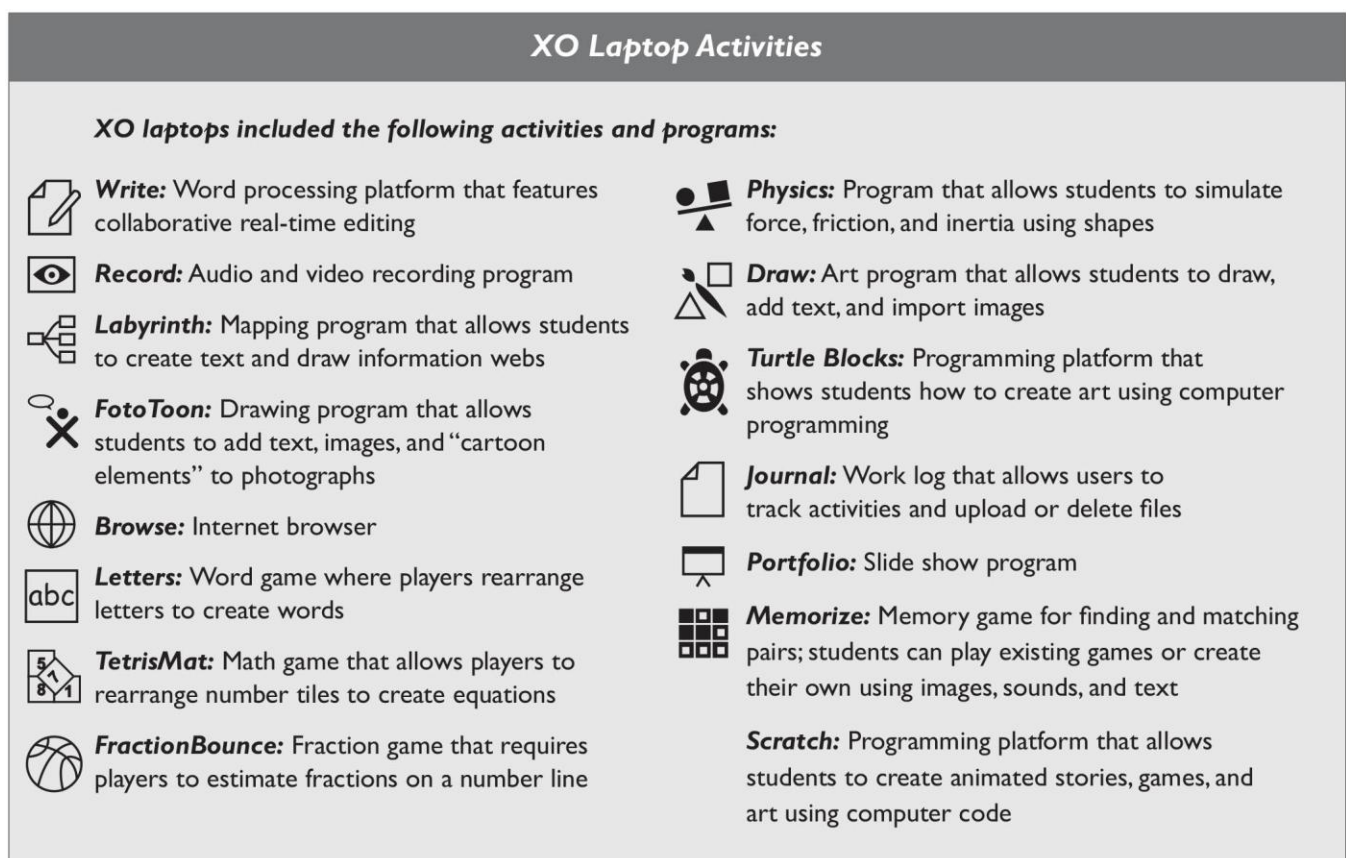
⁶ <http://www.ncleg.net/documentsites/committees/JLEOC/Committee%20Meetings/Archives/2011-2012%20Committee%20Meetings/March%206,%202012/Denise%20Watts%20and%20Anna%20Nelson%20-%20Project%20LIFT.pdf>

Parents of students who brought XO laptops home stated that they did so sporadically, which some parents attributed to teacher or school administrator reluctance to let students leave school with the laptops. When laptops were used at home, parents reported that students used the laptops for 1-4 hours per night and reported “they would be on there all day” if parents did not restrict their children’s usage.

Focus of XO Laptop Use

Although XO laptops came pre-loaded with a set of “Activities” (see Figure 4) and teachers had access to a dedicated technology facilitator in their schools, teachers were still free to use the laptops in ways best suited to their needs in the classroom.

Figure 4. XO Laptop Activities



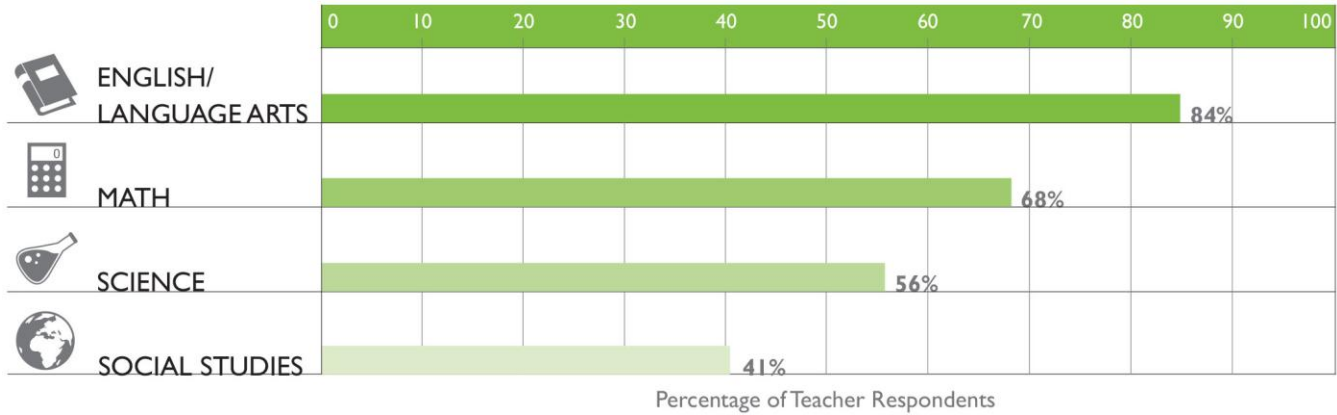
Our research explored teacher and student use to answer the following questions:

- For what subject areas did teachers use the XO laptops?
- What features of the laptops themselves did teachers and students use?
- How did students use their laptops at home?

Students and teachers used XOs for English/Language Arts more than for any other subject. During interviews, principals and technology facilitators reported that students used their XO laptops for all subjects, but most frequently for English/Language Arts. The technology facilitators

speculated that the nature of the Language Arts curriculum made it easier to schedule and integrate technology. Results from the teacher survey confirm the focus on English/Language Arts, but also highlight that teachers were using the XO laptops for math and science lessons as well (see Figure 5).

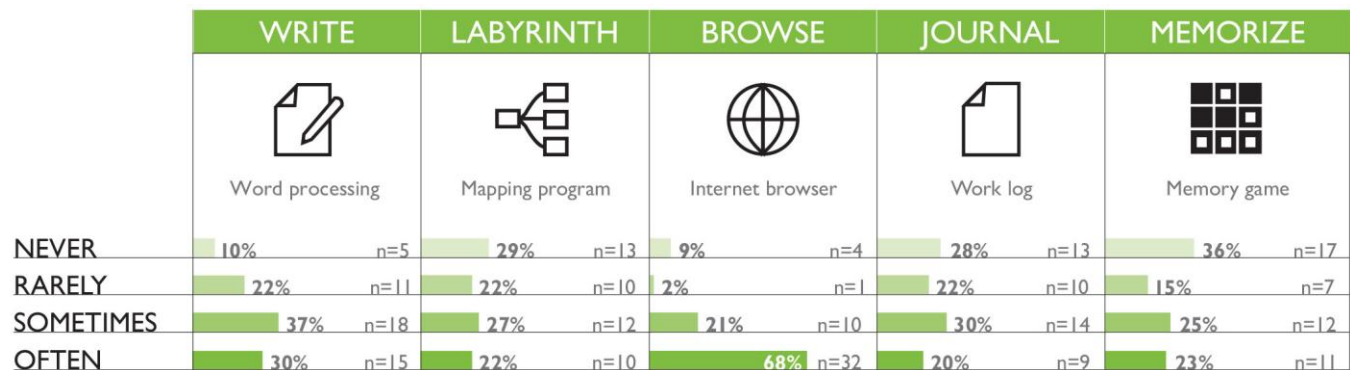
Figure 5. Reported XO Laptop Use by Subject Area



The focus on literacy in both CMS and Project LIFT may have also contributed to XO laptop use for English/Language Arts. During the 2013-14 school year, the North Carolina state legislature mandated that schools provide summer reading programs for any 3rd grade student reading under grade level.⁷ The LIFT office worked with schools to promote literacy activities, which included subscribing to online learning platforms such as Raz-Kids, an interactive program that provides leveled e-books and literacy games for students.

Students and teachers used XO laptops mostly for Internet-based work. Figure 6 displays the frequency with which each of the top five Activities were used.

Figure 6. Frequency of XO Activity Use



As Figure 6 shows, the most frequently used XO Activities among surveyed teachers were “Browse,” the XO laptop’s Internet browser, and “Write,” a word processor. A majority (68%, n=47) of surveyed

⁷ Excellent Public Schools Act, North Carolina General Assembly 2012-142 B. 950, §115C-83.1 (2012).

teachers reported using “Browse” often, compared to 30% who reported using “Write” often. At least half of all teacher survey respondents reported using Browse, Write, and Journal with some regularity. Similarly, during classroom observations, over three-quarters (76%) of classes using XO laptops were using them to access the Internet, with just over half (52%) using them for online learning platforms. Classes not accessing the Internet on their XOs during classroom observations were using the “Labyrinth” and “Write” Activities. Many of the other Activities, however, went entirely unused.

Home use of XO laptops was limited by lack of reliable home Internet access. In an open-ended survey response, several teachers explained that they did not assign homework on the XO laptops because many students lacked Internet connectivity at home, and that it was difficult to find homework assignments that were not Internet-based. Technology facilitators reported that they did not consistently push the home use component of the XO Champions initiative. Said one technology facilitator,

I spoke to teachers a lot about [homework] when [the XO laptops] started going home, but that is one weak area that I think we had this year. They were going home, but I didn't push the homework component that much, and I don't think the teachers did either.

Teachers reported that they did not use the XO laptops as a means to communicate with students or parents outside of school, perhaps due again to families' lack of home Internet access.



Parents whose children did bring the laptops home reported that their children used the devices for playing academic games, reading e-books, and typing homework assignments. Furthermore, when parents were asked whether they or other family members used the XO laptops independently of their children, some parents reported monitoring students' work, but none reported using the laptops themselves. Only one parent reported that one of her other children used the XO laptop to complete homework assignments.

B. XO Champions Student Experiences and Student Outcomes

This section explores students' experiences with the XO Champions initiative in greater detail. We first examine reports from technology facilitators and teachers about how students reacted to the XO laptops, specifically whether they enjoyed using them as a tool for learning. We also include parent perceptions of the value their children derived from the initiative. We then examine student achievement and behavioral data from the CMS following the first year (or year and a half, depending on when the laptops were deployed) of XO laptop use.

Table 4 highlights the successes and challenges related to students' interactions with the XO laptops, including the academic and behavioral outcomes in schools where XO laptops were deployed.

Table 4. Successes and Challenges with Student Use of XO Laptops

	SUCCESS 	CHALLENGES 
STUDENT EXPERIENCES	<ul style="list-style-type: none"> - Students enjoyed using the XO laptops - XOs were intuitive, easy to use - Students felt responsibility for the XOs 	<ul style="list-style-type: none"> - Buy-in varied by student grade level - XOs did not always function well - Some students, especially young students, lost their laptops
PARENT PERCEPTIONS	<ul style="list-style-type: none"> - Parents believed technology was beneficial for their kids 	<ul style="list-style-type: none"> - Not all students brought their laptops home
PERCEPTIONS OF STUDENT OUTCOMES	<ul style="list-style-type: none"> - Teachers and technology facilitators perceived improvement in student engagement 	
Student Academic Outcomes		
<ul style="list-style-type: none"> - A slightly positive or neutral relationship exists between access to XO laptops and student outcomes. 		
Student Behavioral Outcomes		
<ul style="list-style-type: none"> - Classrooms where teachers reported higher than average use of XO laptops had fewer student behavioral infractions. 		

Student Experiences with XO Laptops

School staff and parents reported that students were receptive to and excited about the devices, but they also became frustrated when the laptops broke or when they could not access the Internet.

Students generally enjoyed using the laptops and felt ownership over them. Technology facilitators, teachers and parents alike reported that students enjoyed using the laptops and that the XO laptops got them excited about technology as a tool for learning. Principals, technology facilitators, and teachers commented that students—especially older students—enjoyed the opportunity to take the laptops home with them if they were allowed to do so.

Stakeholders across the school, including teachers, technology facilitators, and principals, also agreed that students enjoyed having “ownership” of the XO laptops. One technology facilitator in particular noted that children valued their XO laptops and tried hard to take care of them “because it belongs to them and they want it to work.”

Students found the XO laptops intuitive, easy to use. In interviews, technology facilitators and principals alike reported that the XO laptops’ approachable platform and intuitive design made it easy for students to operate the machines. This finding held true across grade levels, as young children easily mastered the XO laptop’s structure for “Activities” and were able to manipulate the machines in the classroom. Said one principal, “When [students] first got [the XOs], the kids learned how to use them quicker than the teachers.” Another technology facilitator marveled at how easily even young students were able to become accustomed to the laptops. She said, “So smaller kids can actually use this and the kids know a lot about technology even if the teacher does not know a lot ...with the kids simply exploring, they are learning so many different things.”

Classroom observation data also show that some students engaged in peer-to-peer instruction and troubleshooting with the XO laptops, which suggests that some students were very comfortable using the technology tools and used their expertise to help their classmates.

XO laptop mishaps occurred frequently, and were often linked to Internet connectivity issues. Despite the fact that students liked the XO laptops and found them easy to use, many students became frustrated with a lack of consistent Internet connectivity, according to teachers and technology facilitators. Said one teacher, “It was exciting at first, but students quickly became frustrated with inconsistent Internet capabilities.”

Some parents, teachers and technology facilitators also felt that the younger students lost their XO laptops too easily. One technology facilitator said,

Second grade is the grade where I had a lot of kids losing them. In the morning, the kids would eat breakfast and the child would have their XO with them, then they [would] go to their next block and they [wouldn't] take their XO with them ...I feel that they are so young, first of all to be transitioning between classes, but now to be responsible for taking something with them between classes. That's a big struggle.

As a result of these challenges, technology facilitators and OLPC/Digi-Bridge struggled to keep the machines running well. Moreover, they reported that policing laptop maintenance took time away from other responsibilities in the school.

Parent Perceptions

Parents reported that increased access to technology was a benefit for their children.

Parents did report that the schools did not communicate clearly about appropriate use of the XO laptops at home. However, they also recognized the benefits of the laptops. Said one parent, “In [the future], it's going to be mostly technology. Math and science and learning technology is what they need to learn.” Other parents spoke about facility with technology in general. For example, one parent said, “My kids come home and they know more [about technology than I do]. When I need something on the computer... I call my children to help me because I know that they know.”

Parents disagreed, however, on whether XOs were the appropriate device for their children.

One parent stated that having an XO “teaches the kids how to use a computer,” but others stated that it looked too much like a toy, and some advocated for laptops and tablets that operated on Windows or Apple platforms.

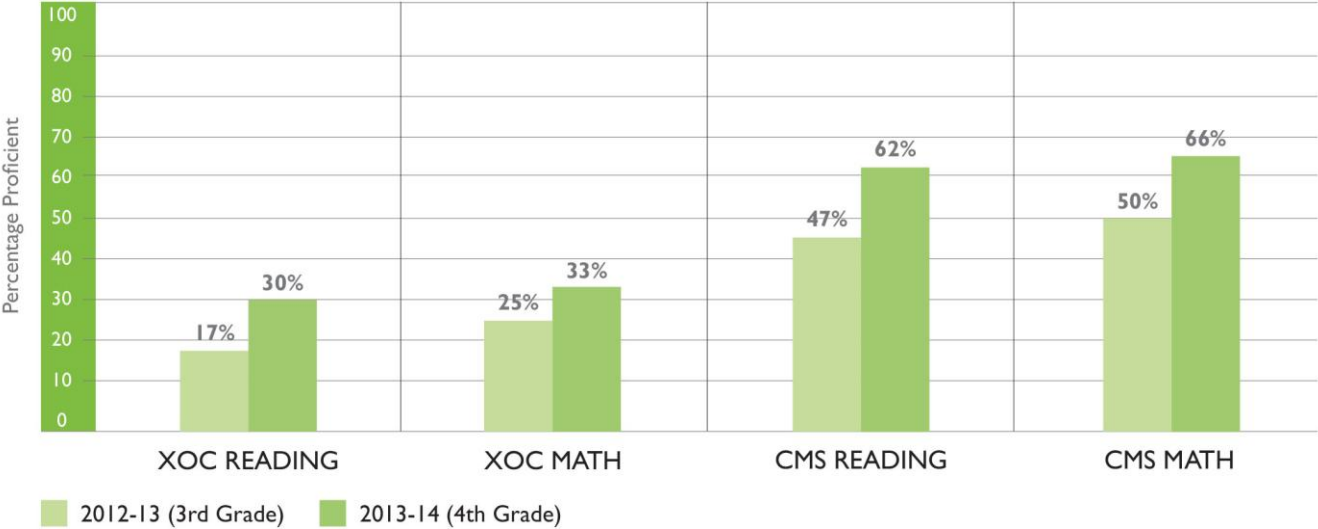
Student Outcomes

While it is premature to determine the effect of the XO Champions initiative on student academic achievement and behavior, descriptive data reveals a slightly positive or neutral relationship between access to XO laptops and student outcomes.

Student academic outcome gains in XO Champions classrooms are inconclusive. As seen in Figures 7 and 8, student proficiency in reading and math increased for current (2013-14) 4th and 5th graders in comparison to their proficiency rates from 2012-13. This is due, in part, to a change in North Carolina’s proficiency standards for all End of Grade (EOG) and End of Course (EOC) standardized tests in 2013-14. It is worth noting that the rate of increase in the percentage of proficient students was higher in reading for 4th and 5th grade XO students than for CMS students, and higher in math for 5th grade XO students than for CMS students.⁸ However, caution should be taken when interpreting these data for a few reasons:

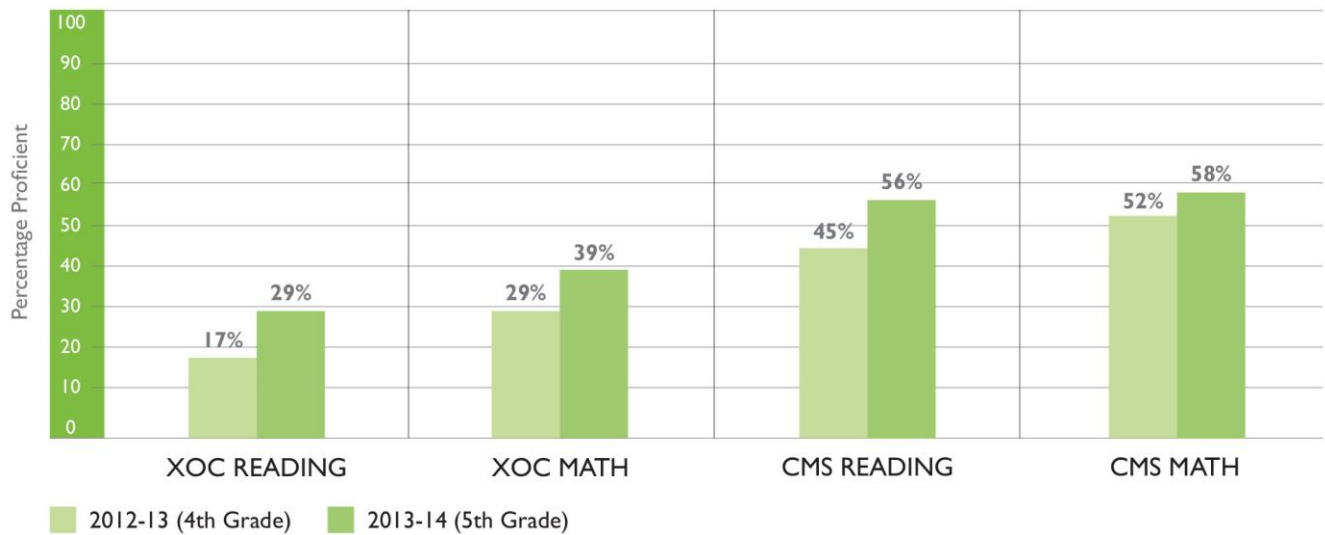
1. Project LIFT students receive other interventions that are not limited to just the XO laptops, making it impossible to isolate the impact XO laptops on student academic outcomes.
2. All of the students within the XO Champions initiative received the laptops, so we were unable to isolate the effect of the XO Champions initiative in particular.

Figure 7. Percent Proficient of 4th Grade Students in XOC Classrooms in 2013-14 Compared to Percent Proficient of Same Cohort in Previous Year



⁸ Among 4th grade students who were in XO Champion classrooms, the percent change in reading proficiency grades was 70% in comparison to 32% for the CMS students. For math, the percent change for students in XO Champion classrooms was 32% compared to 31% for CMS students. Further, among 5th graders, the percent change for XO Champion students was 68% in reading compared to 23% for CMS students. The percent change for XO Champion students in math was 36% in comparison to 12% for CMS students.

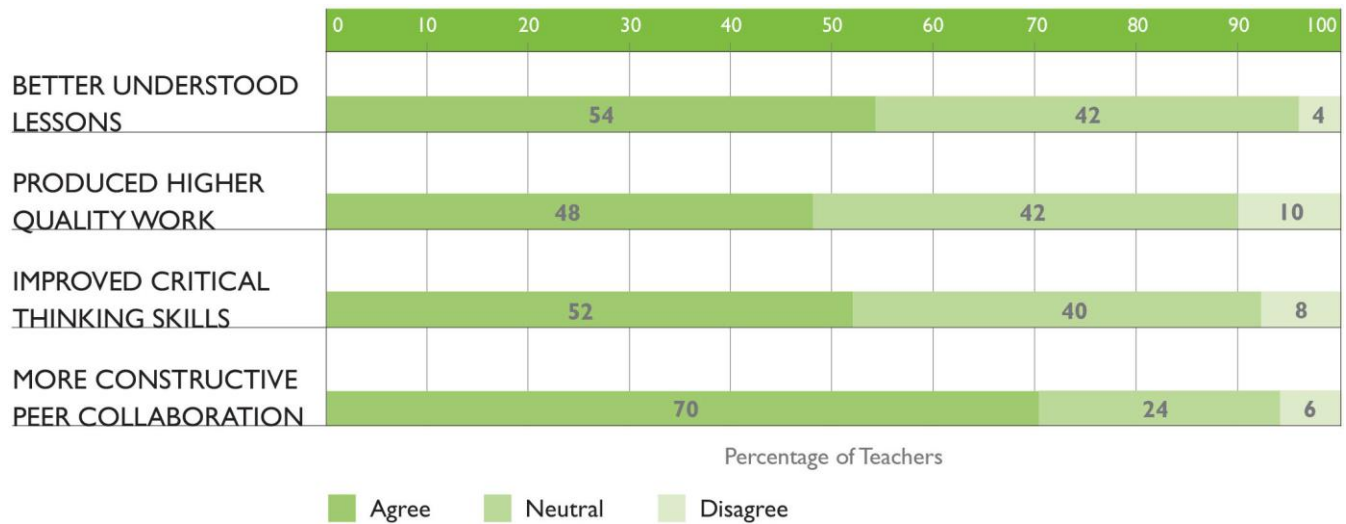
Figure 8. Percent Proficient of 5th Grade Students in XOC Classrooms in 2013-14 Compared to Percent Proficient of Same Cohort in Previous Year



For additional academic achievement analysis, see Appendix B.

Findings from the teacher survey highlight specific areas where the XO laptops might have contributed to increased student academic achievement (see Figure 9).

Figure 9. Teachers' Perceptions of Student Academic Performance as a Result of XO Laptop Use



As shown in Figure 9, a majority of teachers surveyed agreed that using XO laptops led to more constructive peer collaboration (70%) and gave students a better understanding of their lessons (52%). Just under half (48%) also reported that students produced higher quality work when using XO laptops than when using no technology at all.

Interviews and classroom observations help to provide a fuller picture of how laptop use may be related to student academic achievement. None of the technology facilitators or principals interviewed believed

that XO laptops were any more effective than other technologies at improving learning. Rather, they reported that that technology tools in general were beneficial. Said one technology facilitator,

I think the mere fact that they have any form of technology is going to reinforce what the teacher is talking about and is going to increase their knowledge. It's going to make them understand a lot more and practice it because that is what we are using the technology for anyway—to build on what they already know.

Principals and technology facilitators expressed similar convictions about technology use and student achievement, though all acknowledged that these were simply perceptions, and that they had not analyzed end-of-year assessment results.

Student engagement may have increased as a result of XO Champions. In order to assess the behavioral outcomes for XO Champion students, we examined in school suspensions (ISS), out of school suspensions (OSS), and other behavioral incidences. We tagged XO teachers as “High Use” when they reported using the laptops 35% of the week or more; and as “Low Use” as anything under 35%.⁹ Table 5 shows that teachers who reported lower levels of XO laptop usage had students who averaged a greater number of behavioral incidents than did students of teachers who reported high levels of XO laptop usage.

Table 5. Average Total Number of Incidences Received by a Teachers’ Students within XOC

FOCUS AREA	LOW USE	HIGH USE
Average other incidences received by a teacher’s students	19	10
Average ISS received by a teacher’s students	19	10
Average OSS received by a teacher’s students	26	11
Average total incidences received by a teacher’s students	64	32
Average total incidences received by a teacher’s students per academic week	.33	.17

For additional analyses of student behavioral outcomes, see Appendix B.

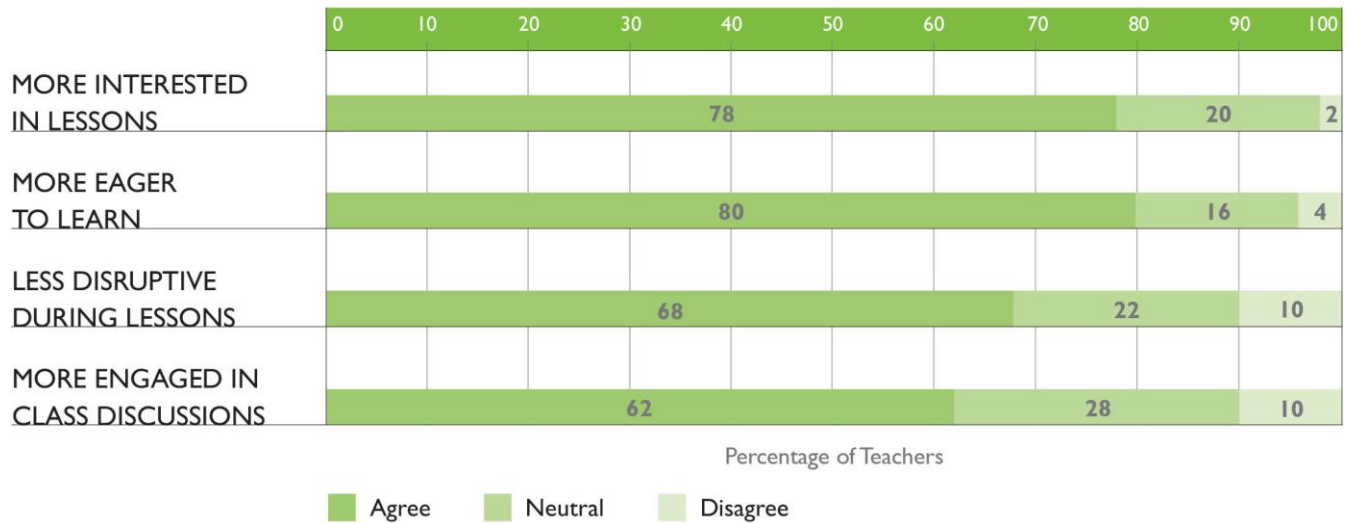
When examining reported student incidences on a weekly basis, the average number of weekly incidences is almost twice as many for students of “low use” teachers (.33) as it is for students of “high use” teachers (.17). Again caution should be taken when interpreting this data for a few reasons:

1. Project LIFT students receive other interventions in addition to XO laptops, and because we could not control for this factor, we cannot determine how much of an impact XO laptops have on student behavioral outcomes.
2. The sample size for each group is small so we cannot determine whether the differences between the two groups are statistically significant.

⁹ This split was to ensure that we had close to half of the students in both groups. The groups were based on the teacher’s self-reported percent of XO laptop use on a weekly basis in the spring survey.

Although the outcomes data remain inconclusive, survey and interview respondents generally agreed that students were more motivated and engaged when using XOs compared to when they did not use technology (see Figure 10).

Figure 10. Teachers’ Perceptions of Student Engagement as a Result of XO Laptop Use



As shown in Figure 10, of the teachers surveyed, 80% agreed that students were more eager to learn, 78% agreed that students were more interested in lessons, and 62% agreed that students were more engaged in class discussions. Additionally, 68% agreed that students were less disruptive during lessons. Some teachers included additional details in their open-ended responses. For example, one teacher reported that XOs had “really boosted the self-confidence levels of some students and motivated them to learn,” and another attributed growth in math, reading, and science directly to XO laptops. Similarly, data from classroom observations indicated that almost all students were on-task when using their laptops.

C. Teacher XO Laptop Use



The XO Champions initiative was designed in part to encourage elementary school teachers to explore “new channels of learning, sharing, and self-expression.”¹⁰ In this section, we examine how teachers used the XO laptops as instructional tools. Our data speaks to three aspects of the teacher implementation experience:

1. Teachers’ perceptions of the initiative as a whole;
2. The degree to which teachers integrated XO laptops into their teaching practice; and,
3. Changes in teachers’ technology proficiency and comfort levels over the course of the initiative.

Table 6 lists the general successes and challenges in the implementation of the XO Champions initiative from the teacher perspective. We then explain these themes in greater detail.

¹⁰ Source: Memorandum of Understanding between Project LIFT and OLPC (2013).

Table 6. Successes and Challenges in Teacher Use as Reported by Teachers

	SUCCESS 	CHALLENGES 
PERCEPTIONS OF THE INITIATIVE	<ul style="list-style-type: none"> - Teachers generally valued having technology in the classroom 	<ul style="list-style-type: none"> - Teachers overall had mixed feelings about the success of the initiative - Hardware issues and XO design problems negatively influenced teachers' perceptions of the initiative
INTEGRATION	<ul style="list-style-type: none"> - Teachers used the XOs for academic purposes - Some teachers used XOs to enhance their instructional goals 	<ul style="list-style-type: none"> - XO laptop use was not critical to teachers' lessons - Teachers did not consistently use XOs for differentiated instruction, small group work
TEACHER OUTCOMES	<ul style="list-style-type: none"> - Teachers became more comfortable with technology over time - Teachers' technology proficiency levels continued to rise 	<ul style="list-style-type: none"> - Technology proficiency varied by teachers' experience-level

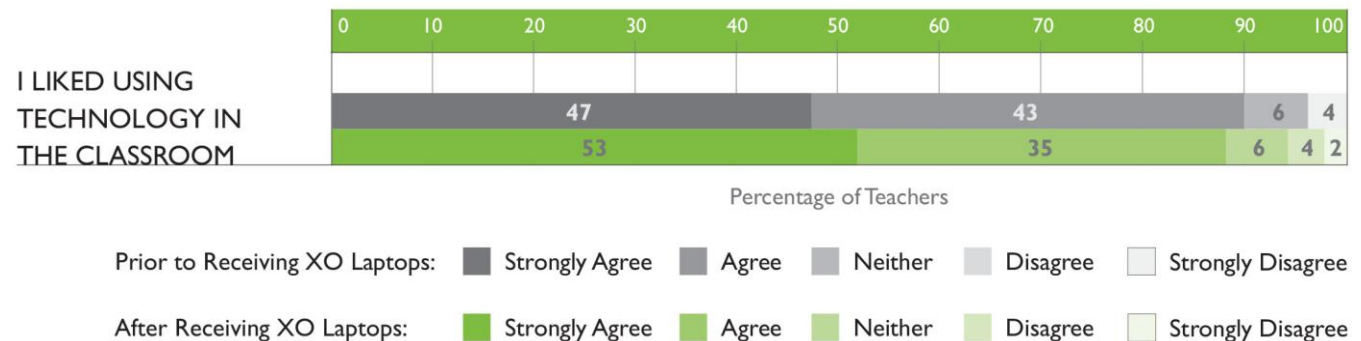
Teacher Perceptions of the XO Champions Initiative

Teachers' survey responses indicated generally positive feelings toward classroom technology, but mixed feelings about the success of the XO Champions initiative in particular. Much of the negativity about the initiative was related to teachers' frustration with XO laptops' inconsistent Internet connectivity.

Teachers valued education technology as a tool for instruction and student learning.

Responses on the teacher survey indicate that a majority of teachers generally embraced a technology-rich learning environment. Reported support for education technology was high and generally increased over the course of the XO Champions initiative (see Figure 11).

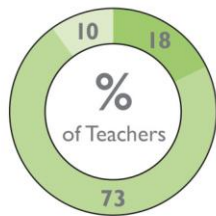
Figure 11. Teachers' Reported Perceptions of Education Technology Use in General



Note: For Liked using technology in the classroom, n=51; For Skilled at using online content in the class, n=50.

As shown in Figure 12, a majority of teacher respondents (73%) reported no change in their support for education technology. Comparing Figure 11 and 12, we found that, of the “no change” teachers, nearly half (43%) had already strongly agreed that they liked using technology in the classroom prior to receiving their XO laptops.

Figure 12. Teachers’ Reported Perceptions of Support for Education Technology



I LIKED USING TECHNOLOGY IN THE CLASSROOM _____

■ Positive Change ■ No Change ■ Negative Change

Hardware issues, XO design problems and a lack of connectivity negatively influenced teachers’ perceptions of the initiative. Interview and open-ended response data reveal, however, that technology facilitators and teachers did not believe the XO Champions initiative was wholly successful. On the open-ended survey questions, some teachers said that they did not like the design or functionality of the XOs. Issues that were most frequently mentioned were:

- Screens were too small
- Activities were not compatible with other software tools (for example, Microsoft Office suite products)
- Screens froze during lessons
- Devices lacked printer access
- Batteries did not hold a charge

However, difficulty connecting to the Internet was the most frequently-cited problem. When the XO laptops lost connectivity, technology facilitators had to redistribute the working machines, often using other technology devices (including Chromebooks and iPads) to fill the gap. Said one teacher,

[The XOs] were malfunctioning as often as they were working, so it made it very hard for me to use them effectively in my classroom. When we did try to use them, I spent the entire time troubleshooting technical issues so it was difficult for me to facilitate their use for purposeful instruction.

During one classroom observation, a teacher instructed students to use their XOs only if the students were positive that their devices could connect to the Internet. Additional classroom observations revealed that students would occasionally have to restart their XO laptops in order to reconnect to the Internet as well.

Similar to earlier findings about grade-level differences in experiences with the XO Champions initiative, teachers’ perceptions of the program’s success varied by grade level. Lower grade teachers

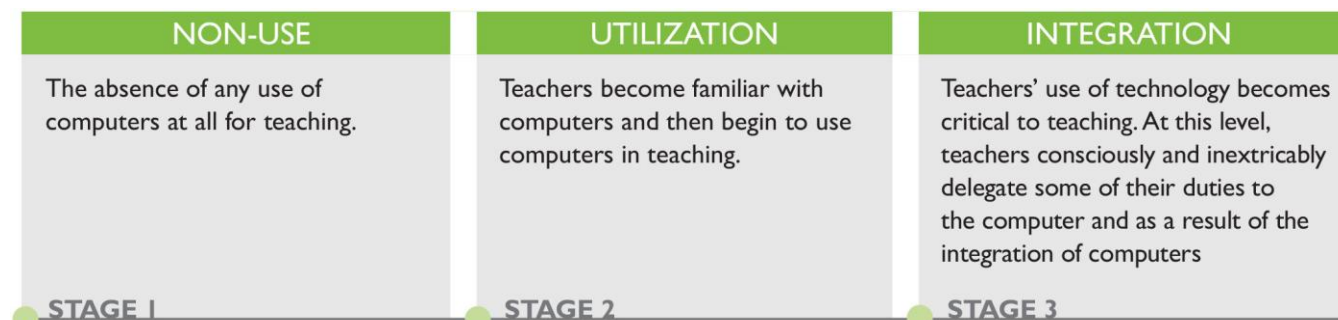
(2nd-3rd) generally perceived the initiative as more successful than upper grade teachers (4th-5th), who provided primarily negative or mixed reviews of the initiative.

Teachers' Integration of XO Laptops

This section addresses the *intensity* of teachers' XO laptop use in the classroom. Specifically, we examine the degree to which teachers fully integrated the XO laptops into the core of their instruction, as well as the ways they used the laptops to configure their classrooms and lesson plans.

To analyze teachers' integration of XO laptops into their classrooms, we draw on a rich literature that studies teachers' openness to adopting new strategies and tools into their instructional practice. The "concerns-based adoption model" (CBAM) framework posits that teachers go through various "stages of concern" and "levels of use" as they become accustomed to new teaching tools, for example the XO laptops.¹¹ Figure 13 depicts the various stages of technology incorporation according to this framework.

Figure 13. Stages of Classroom Technology Incorporation



Source: Marcinkiewicz (1994)

XO laptop use was not critical to teachers' instructional approach. Using the framework established by Marcinkiewicz,¹² we found that a majority of XO use observed during classroom visits fell into the "utilization" category. Drawing from classroom observations, XO activities in the "utilization" category were not at the core of instruction, for example browsing the Internet, reading e-books, using a stopwatch function to time the duration of a science experiment, and typing out spelling words. Interviews with technology facilitators and school principals supported this finding. For example, one technology coordinator reported that some teachers in her school only used XO laptops for enrichment purposes and playing games. Technology facilitators suggested that teachers were more likely to use Internet-based resources and other "utilization" activities if they felt unsure of how to best use the XOs for classroom instruction.

Site observations and interviews with technology facilitators revealed that only a handful of teachers were able to move beyond the utilization stage and into the "integration" category of the framework.

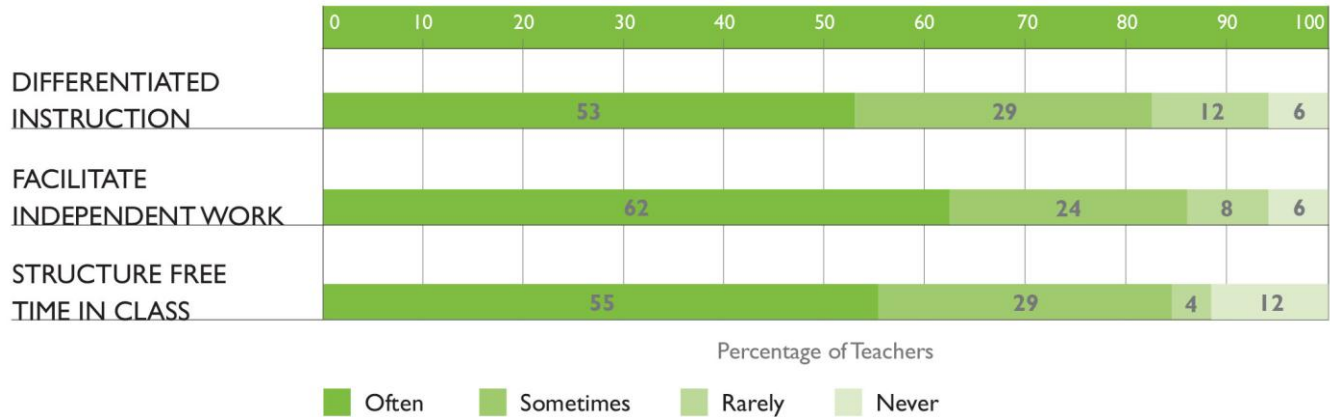
¹¹ Newhouse, C. P. (2001). Applying the Concerns-Based Adoption Model to Research on Computers in the Classrooms. *Journal of Research on Computing in Education*, 33(5).

¹² Marcinkiewicz, H. R. (1994). Computers and teachers: Factors influencing computer use in the classroom. *Journal of Research on Computing in Education*, 26(2), 220-237.

These teachers designed lessons and activities so that students were required to work collaboratively to complete research, share documents, and edit reports.

Teachers used the XO laptops to structure a variety of different classroom configurations. Although the finding above suggests that teachers used the XO laptops in a relatively superficial manner, our survey data reveal that teachers did use the XO laptops to support a variety of instructional approaches in their classrooms (see Figure 14).

Figure 14. Teachers’ Reported Use of XO Laptops to Structure Their Classrooms



Notes: For Differentiated Instruction, n= 51; For Facilitate Independent work, n= 50; For Structure free time in class, n= 51.

As shown in Figure 14, teachers reported that they frequently used the XO laptops to aid in differentiated instruction, facilitate independent work, and structure free time in class. Classroom observations revealed trends similar to those found in the survey, but also found that these configurations were often used simultaneously in the classroom. One teacher, for example, gave students the option of working independently or in small groups to complete an online research activity. Technology facilitators reported similar findings, but differed in their assessment of teachers’ ability to use the XO laptops to differentiate instruction, noting that very few teachers used XO laptops for this purpose. This discrepancy in the data may be due to a lack of common understanding among teachers as to what constitutes XO-enriched differentiated instruction.¹³

Teacher Comfort Levels and Technology Proficiency

Although most teachers reported that they did not fully integrate the XO laptops into their instructional practice, the data suggest that teachers themselves may have benefitted from the XO Champions initiative in other ways. Both teachers and technology facilitators reported increased levels of comfort and proficiency among teachers.

¹³ The guideline in the observation protocol was the following question prompt: “Did teachers use XO laptops to provide specialized attention to specific students?”

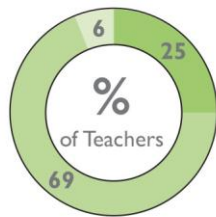
Teachers adjusted to the XO laptops over the course of the school year. In the survey, teachers were asked about how their comfort levels using technology for instruction changed over the course of the 2013-14 school year. Figure 15 displays teachers’ reported comfort levels at the beginning of the school year, and then at the end.

Figure 15. Teachers’ Reported Comfort with Technology over the Course of the XO Champions Initiative



As shown above, a majority of teachers (69%) reported no change in their comfort levels over time (see Figure 16). Comparing Figures 15 and 16, we found that, of those who reported no change, a majority (55%) reported that they already strongly agreed that they were comfortable integrating technology into the classroom prior to receiving XO laptops.

Figure 16. Teachers’ Reported Comfort with Using Technology for Instruction



COMFORTABLE USING TECHNOLOGY FOR INSTRUCTION

■ Positive Change ■ No Change ■ Negative Change

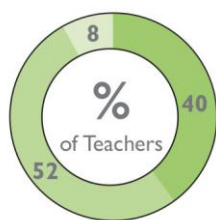
The qualitative data support these survey findings—technology facilitators and principals reported nearly unanimously that teachers either started the year already comfortable with technology, or became more comfortable using the technology over the course of the school year. They attributed the rise in teacher comfort level to pockets of teachers who were open to technology use from the start, and also to professional development from technology facilitators. Said one principal,

Our OLPC facilitator has tackled [raising teacher comfort levels]. She works very closely with teachers to help them overcome barriers and celebrate them when they have successes... So our use of the XOs this year has been much more consistent and much more effective than it was last year.

Additionally, principals and technology facilitators reported that, as the initiative progressed, teachers took more risks and consulted technology facilitators more often. One principal reported that, once her teachers became comfortable with the technology, they were “experimenting a lot more because they know this is the direction that we’re heading.”

Teachers’ technology proficiency levels were already high, but continued to rise. We asked teachers how the infusion of XO laptops changed their proficiency levels with technology devices (see Figure 17).¹⁴

Figure 17. Teachers’ Reported Changes in Technology Proficiency over the Course of the XO Champions Initiative



CHANGES IN TECHNOLOGY PROFICIENCY _____

■ Positive Change ■ No Change ■ Negative Change

Figure 17 shows that 92% of teachers reported either positive change or no change in their technology proficiency levels.

Increases in technology proficiency varied by teacher experience. As shown in Figure 18, reported technology proficiency levels varied by years of teaching experience.

Figure 18. Teachers’ Reported Technology Proficiency by Years of Teaching Experience



LESS THAN 5 YEARS 5 OR MORE YEARS _____

■ Positive Change ■ No Change ■ Negative Change

As shown above, teachers with less than five years of teaching experience were more likely to report increases in their technology proficiency than were more-experienced teachers. This finding contradicts a commonly held belief that younger teachers are usually more technology savvy than veteran teachers.



¹⁴ Technology proficiency does not measure teachers’ success at incorporating technology into the classroom; rather, it is a measure of the ability to use the devices themselves, for example the functionality of hardware and software.

D. School Supports

Project LIFT hired in-school technology facilitators to “build local capacity in technical aspects such as setting up local infrastructure and connectivity and all other aspects regarding software, hardware, maintenance, and repairs.”¹⁵ Each technology facilitator was responsible for maintaining the XO program within the school and providing general technology support, including infrastructure development and hardware and software management.

As shown in Table 7, this section focuses on the successes and challenges associated with XO Champions support, including teachers’ perceptions of these supports, and the professional development offerings for both teachers and technology facilitators, and technology support and repairs.

Table 7. Successes/Challenges in School Supports

	SUCCESS 	CHALLENGES 
BUY-IN	<ul style="list-style-type: none"> - School staff liked having access to classroom technology tools - School staff liked the XO Champion initiative’s model of support 	<ul style="list-style-type: none"> - There was wide variation in technology facilitator support models across the schools
PROFESSIONAL DEVELOPMENT AND TECHNOLOGY TRAINING	<ul style="list-style-type: none"> - Technology facilitators felt they had adequate support 	<ul style="list-style-type: none"> - Some teachers were frustrated by the lack of professional development opportunities and quality of tools - Parents did not feel supported in using the XO laptops at home
TECH SUPPORT AND REPAIRS		<ul style="list-style-type: none"> - Users experienced challenges getting the XO laptops to connect to the Internet - Upgrades were not timely

E. Buy-In to Supports

Principals and teachers reflected on the types and quality of technology support provided by technology facilitators, Project LIFT, and the school district. During interviews, principals spoke highly of the technology facilitator model and the facilitator’s dedication to supporting the XO initiative. While teachers also reported that they were generally appreciative of the supports offered, they also noted that timing and Internet connectivity posed challenges for successful implementation.

School staff liked having access to classroom technology tools, as well as to the XO Champion initiative’s model of support. Although teachers and technology facilitators alike became frustrated by the hardware and connectivity problems with the XO laptops, many respondents noted that they would rather have technology tools like the XOs than have a technology-free classroom.

¹⁵ Source: Memorandum of Understanding between Project LIFT and Digi-Bridge.

For example, one teacher believed that the XOs were important because they “put technology into students’ hands.”

Teachers also generally liked having a technology facilitator available in their school for targeted support; a majority (72%) of surveyed teachers agreed that their technology facilitator provided support to help with technology integration. Principals and technology facilitators also appreciated the XO Champions model for support. Said one technology facilitator,

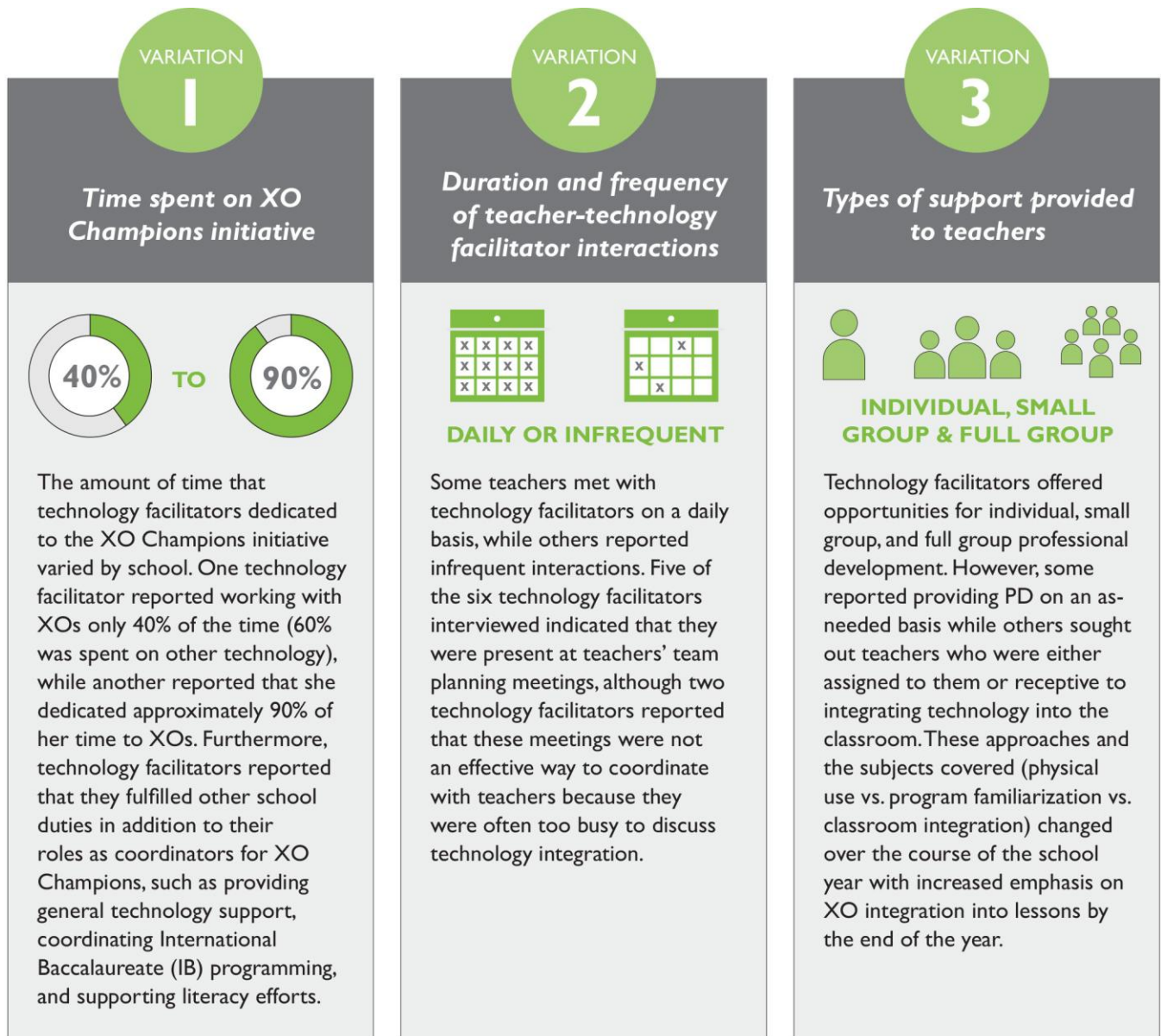
I think that a big success is having a facilitator on campus. I am not quite sure what the program would have looked like without a person on site to be responsible and uphold a vision for the program.

Respondents cautioned, however, that teachers did not always immediately understand the role of the technology facilitator; rather, they gradually warmed up to using technology facilitators as a way to better integrate the XO laptops into their classroom instruction. One technology facilitator explained that her role as a support for technology integration started small and gradually spread to teachers throughout the school. She said,

That’s how it opened up the doors and I was able to build really great relationships with the teachers so they knew I was always there. ‘I’m there for you. I’m not here to evaluate you or observe you, I’m here to support you.’ Once they saw that, they saw that it is useful to have me come in and support them.

There was wide variation in technology facilitator support across the schools. Using data from technology facilitator interviews, we describe variations in technology support across three areas (see Figure 19).

Figure 19. Variation in Technology Support



F. Professional Development for Teachers and Technology Facilitators

Teachers received professional development from a variety of sources, both internal and external to CMS (see information below). Drawing from technology facilitator interviews and teacher survey responses, we report on the quality of support provided to teachers, the type of support provided for home use, and the amount of professional development that technology facilitators received from various providers.

Professional Development Offerings for XO Champions

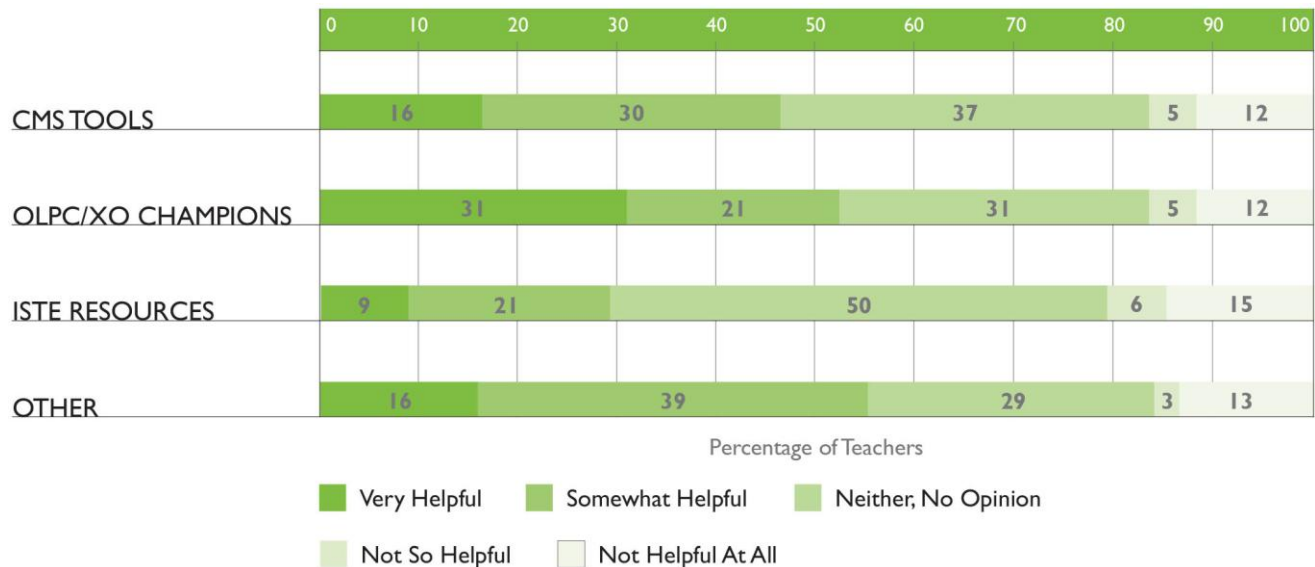
CMS Tools: Teachers had access to optional CMS tools and professional development trainings, some of which touched on technology integration.

OLPC/Digi-Bridge: During the 2012-2013 academic year, all XO Champion teachers attended a mandatory two-day teacher training. Additionally, OLPC sponsored monthly professional development sessions at each of the school locations. These sessions were open to all Project LIFT personnel. Facilitators also offered school-based, ongoing trainings responsive to the needs of their community, and these trainings were supported with funds from OLPC. In the second year, OLPC offered two optional teacher trainings at the beginning of year. OLPC also provided training at two learning community professional development days and at all of the learning community's evening professional development sessions. When Digi-Bridge began providing consultancy in April of 2014, professional development at each school site continued.

ISTE Tools: A select number of teacher leaders (5) were sponsored by Digi-Bridge to attend the annual International Society of Technology in Education (ISTE) conference. Upon return, these teachers were charged with leading a professional development session on the ISTE tools.

Teachers had mixed reviews of the quality of professional development opportunities. As shown in Figure 20, there is variation in the perceived utility of the available resources.

Figure 20. Teachers' Reported Support for Professional Development Resources



Among teachers that received professional development tools from the sources above, about half of teachers found the XO Champions tools and/or the CMS tools helpful, while a lower percentage of teachers reported they found the ISTE tools helpful. Between 16% and 21% of the teachers did not find any of the resources available to them very or even somewhat helpful. Based on open-ended survey questions related to challenges and supports, approximately two-fifths of teachers (n=51) indicated that they did not feel supported enough in daily XO utilization. One teacher stated that she only received

technology help once a week, and only when the XOs were broken, which made it “very difficult to get help or get questions answered.”

The main areas of support requested by surveyed teachers were:

- 1) Incorporating XO laptops into lessons
- 2) Learning about XO laptops’ capabilities and software
- 3) Learning how to repair XO laptops

However, technology facilitators reported that, even when teachers requested additional support with the XOs or other technology, it was difficult to find time to make those trainings a reality. One reason for this difficulty was the sheer number of new initiatives being implemented in the Project LIFT schools at the same time. Schools were inundated with other professional development opportunities that, for one technology facilitator, meant that XO laptop integration got “pushed to the side.”

Support for XO Champions home use was insufficient. Technology facilitators offered varying degrees of support for parents. Three technology facilitators described plans for parent sessions, but all reported that they should have been more proactive in promoting them. One technology facilitator held workshops for job resumes and applications but said that attendance was low. Another technology facilitator reported that the school tried to design a parent workshop during spring break, but she did not follow through with it. Only one technology facilitator reported having some success with parent workshops. She reported that the parents who attended were “very excited” about the XO Champions initiative, but also cautioned that the workshop itself was not well-attended.

Parents who participated in parent focus groups reported either that they did not receive information regarding the XO Champion initiative or that communication about the initiative was poor. For example, one parent stated, “I wish they had an information session because I did not know that you could log on if you had Wi-Fi until you [another parent in the focus group] just said that. I knew they had those little [ears], but I didn’t know what they were really for.”

Other parents suggested having information sessions or distributing pamphlets on how XO laptops work so that parents could operate the laptops and/or repair them.

Technology facilitators received sufficient general and XO-specific professional development. Technology facilitators reported that the XO Champions initiative was designed not just to provide teachers with support, but also to establish a systemic approach to support, which included providing training and professional development opportunities for technology facilitators. Technology facilitators met as a cohort once a month to collaborate and share ideas for XO Champion programming at their respective schools.

The school district also offered professional development programs that were open to Project LIFT technology facilitators. One technology facilitator stated that CMS gave her access to “a ton of technology trainings” on a CMS professional development webpage. She went on to say that these technology trainings were particularly helpful in managing the non-XO classroom technologies. Overall,

the technology facilitators reported that the level of support provided by Digi-Bridge and the school district was sufficient.

Technology Support for XO Laptops

Throughout interviews and surveys, school staff cited Internet connectivity and hardware and software issues as major challenges. Technology facilitators, who were expected to provide technical development support, expressed concerns related to schools' technological infrastructures and XO laptops' abilities to allow for software updates.

Poor XO Internet connectivity and design frustrated school staff. Beyond the structural connectivity with the machine itself, teachers and technology facilitators complained that schools were poorly equipped to handle online learning. In several schools, temporary classroom trailers had poor internet connectivity. Said one technology facilitator,

We have one team that struggles with [Internet access], but that was because they are out in the trailers and Wi-Fi was not the best out there so that caused a lot for problems. And, of course, after a lesson or two where they would be planning on it and the Wi-Fi went down, they stopped using them all together.

Inadequate bandwidth was also a frequent problem. "Trying to have 20+ students access the Internet proved to be frustrating to say the least," explained one teacher in an open-ended survey response. Slow loading times were observed in three classrooms during classroom observations as well.

XO laptop upgrades were not timely. Two technology facilitators also expressed frustration that the XO laptops did not allow for frequent updates to the Internet browser to keep up with online technology updates.

III. Discussion and Recommendations

Our study shows that technology facilitators, principals, teachers, and parents all generally appreciated the XO Champions initiative and its ability to support their vision of technology-enriched instruction. A majority of teachers reported that their comfort levels and technology proficiency levels, though already high, continued to improve with the advent of the XO Champions program. And, although it is difficult to make sweeping claims about the relationship between XO laptop use and student outcomes, our findings suggest that the XO Champions program may be associated with slight positive gains in academic achievement, and well as reduced behavioral incidences. Finally, teachers and principals alike highly valued the XO Champions support structure, wherein school-based technology facilitators aided with coaching, professional development, and technology support.

The XO Champions program was not without its challenges, however. Teachers and technology facilitators viewed XO laptops as complementary, rather than integral, to student learning and did not perceive the XO Champions initiative as a driver of education reform. Additionally, principals and stakeholders reported that the *concept* of a one-to-one laptop initiative was more important than the specific continued use of XO laptops and the XO Champions initiative in particular.

There were two main sources of frustration in the first year and a half of implementation of the XO Champions initiative. The first is that technology facilitators and teachers did not have a clear set of expectations around the way the laptops should be used in the classroom. This lack of guidance ultimately led to considerable variation in implementation of the initiative both within and across schools. The second was inconsistent Internet connectivity, which was attributable in part to a flaw in design of the XO laptops, and in part to underlying infrastructure problems in Project LIFT elementary schools.

Our primary recommendation addresses both of these barriers to implementation: Establish a comprehensive technology plan prior to laptop deployment. A comprehensive technology plan is one that:

- Begins with a thorough needs assessment. A needs assessment can inform three critically important aspects of a one-to-one initiative: 1) the selection of the appropriate one-to-one device; 2) the infrastructure to support the initiative as a whole; and 3) the presence of competing devices or technology tools already in place. Although the problem with the XO laptop devices' wireless connectivity might have been difficult to detect prior to implementation, the lack of connectivity in certain areas of school buildings is a predictable event, as is the potential for having competing technology devices in classrooms. Conducting a needs assessment can therefore prevent an inundation of technology devices that is confusing for teachers and complicates the work of technology facilitators. A needs assessment can also help to target technology investments to the grade levels and/or subject areas where it will have the greatest projected impact. In the case of the XO laptops, the data suggest that XO laptops may be best-suited for lower grades in English/Language Arts.
- Establishes minimum usage goals. Setting firm expectations around both the frequency and focus of usage allows technology facilitators to provide consistent support to teachers. While principals and technology facilitators indicated that they would like to see more integration efforts and consistent usage, none of the schools in this study established specific guidelines or goals related to XO laptop usage. If schools outline parameters for laptop usage and build in sufficient support to achieve their goals, teachers will be able to more successfully integrate laptops into daily classroom activities. These goals will also reduce variation in teacher usage within schools and across subjects. Finally, if a goal of the one-to-one laptop initiative is for students and families to use the laptops in the home, as it was in the XO Champions initiative, there must be a defined set of goals and supports for home use of the laptops. These expectations should be accompanied by trainings for families and consistent communication from the school.

- Creates a defined program of support for teachers using school-based technology facilitators. Although teachers liked having access to school-based technology facilitators, they reported they would have liked a more extensive set of professional development opportunities. Accordingly, technology facilitators should provide these training opportunities using regular check-ins and one-on-one coaching where necessary throughout the year, focusing their efforts on new teachers who may be unfamiliar with integrating technology into their lessons. The system of support should also include support around the devices themselves. Surveyed teachers reported that they did not use XO laptops because they were unreliable and often required repairs or additional support for connecting to the Internet. Technology facilitators agreed that the number of repairs and upgrades required hindered their ability to return functioning laptops in a timely manner. Technology support—for example, tech support staff and trainings for teachers on how to troubleshoot their devices—could further support laptop integration into the curriculum by improving teachers’ confidence in the laptops’ reliability.

Putting in place a comprehensive technology plan requires a significant investment in time, resources, and staff—a luxury that many urban school districts rarely have. The benefits to be gained from a careful consideration of the technology plan prior to the deployment of devices, however, is likely critical to the success of the initiative.

For Project LIFT schools, adjustments to the implementation of the initiative may be too little too late. Beginning in the 2014-15 school year, Project LIFT began to move away from XO Champions as its primary technology solution. However, the lessons learned from the project are applicable to LIFT schools (that are still using the XOs), as well as to a broader set of schools and districts that have invested in one-to-one laptop initiatives.

Appendix A. Methodology

Survey Development

The teacher survey was designed to gain the perspective of teachers, and captures teachers' perceptions and utilization of XO laptops over the course of the 2013-14 school year. The web-based survey was administered on June 3, 2014 to the teachers who received XO laptops as early as spring 2013 and as late as spring 2014. Weekly email reminders were sent to the participants. Responses were received from 51 of the 104 teachers that were part of the XO Champions initiative, yielding a 49% response rate. One participant was randomly selected to receive an incentive in the form of a \$50 Amazon electronic gift card. The final survey responses were representative of the seven Project LIFT elementary schools participating in the XO Champions initiative.

The survey population was based on the number of elementary school teachers teaching in one of the seven XO Champions schools. The list for the teacher population was provided by Digi-Bridge. The data collected for this survey asks for teachers to answer questions about their classroom instruction prior to and after receiving XO laptops. It also asks teachers to report on perceived student usage, the supports they received during the XO initiative, and if there were any other technology utilized in class outside of the XO Champions Initiative.

Challenges and Limitations

Qualitative data collection was limited by timing and availability of key stakeholders. Specifically, RFA was unable to interview one technology facilitator who was on maternity leave, and parent focus groups represented a convenience sample of families who attended a Project LIFT community event. The focus group participants were non-representative of Project LIFT schools and grade levels; only four of the seven schools were represented in the focus groups. Additionally, focus groups were conducted in a public space and were prone to disruptions. Classroom observations were limited to a roughly representative sample of classrooms (by grade level and by school) and were all conducted in one month (May 2014).

Three challenges arose in survey analysis. First, since the teacher survey was administered at the end of the school year, analysis was limited to teachers' retrospective reports of their comfort and proficiency with technology, rather than a comparison of survey results from the beginning and end of the school year. Second, we were unable to measure how the XO Champions program impacted teachers' perceptions of comfort and proficiency if they reported that they were at an "Expert" level prior to and after receiving the XOs since the "Expert" rating was unchanged. Finally, the coupling of a relatively low response rate (49%) and inconsistent delivery dates and grade levels for XO laptops impeded RFA's ability to provide additional, robust descriptive information regarding grade level and dosage analyses.

Appendix B. Additional Analyses

Additional Analysis of Behavioral Data

In the main body of our report (Table 5, pg. 16), we provide analysis of the average total number of incidences received by students, based on whether those students' teachers were either "high use" or "low use" users of XO devices.

Table 1B. Average Total Number of Incidences Received by a Teachers' Students within XOC

FOCUS AREA	LOW USE	HIGH USE
Average other incidences received by a teacher's students	19	10
Average ISS received by a teacher's students	19	10
Average OSS received by a teacher's students	26	11
Average total incidences received by a teacher's students	64	32
Average total incidences received by a teacher's students per academic week	.33	.17

Table 2B provides additional information related to this analysis, parsing out high use and low use of XO devices by the low grade levels (K-3) and upper grade levels (4-5).

Table 2B. Average Total Number of Incidents Received by Teachers' Students within XOC by Grade Level

FOCUS AREA	LOW USE (Grades K-3) n=14	HIGH USE (Grades K-3) n=12	LOW USE (Grades 4-5) n=10	HIGH USE (Grades 4-5) n=15
Average other incidents received by a teacher's students	19	3	18	17
Average ISS received by a teacher's students	19	1	18	17
Average OSS received by a teacher's students	28	5	24	16
Average total incidences received by a teacher's students	66	9	60	50
Average total incidences received by a teacher's students per academic week	.34	.05	.32	.27

As shown in Table 2B, among grades K-3, teachers who reported lower levels of XO laptop use had students who averaged a higher number of behavioral incidences than did students with teachers who reported high XO use. Among grades K-3, the average number of total incidences received by students in low use XO classes is .34 incidences per week when compared to students in high use XO class which is .05 per week.

Among 4th-5th grades, there was no major difference between the average in-school suspension (ISS) and other incidences received by students based on XO laptop use. However, for students who received out-of-school suspensions (OSS), the average number was higher for students in with low use XO laptop classrooms (n=24) than for high use XO classrooms (n=16). Overall among 4th-5th graders, the average total incidences received by students of low use teachers is .32 incidences per week and for students of high use teachers the average total incidences is .27.

Additional Analysis of Academic Data

We also ran an additional set of analyses that compares the academic outcomes of students and teachers' reported use of XO laptops. This analysis is more complicated than the above comparison of teachers' reports of XO use and student behavior. To examine the relationship between XO use and reading or math proficiency, we need to examine student outcomes, bearing in mind that students could be in multiple classes. Some of these classes may have teachers with high levels of use of XO laptops and some classes with low use teachers.

We therefore created a table that compares the number of high XO use classes that a student attended and examined the average proficiency scores for students who attended one high XO use class, two high XO use classes, etc. It is important to note that schools had different lengths of time for each class period and we do not have measures of the duration of each class. Our use of a count of high XO classes as a measure of intensity of exposure to XO laptops provides only an approximate measure of XO use.

Table 3B below shows the exposure to high XO use by academic proficiency levels by grade for both reading and math in the 2013-14 school year. The average proficiency scores indicate the percentage of students for the indicated number of high use XO classes that received a proficiency score of either a 3, 4, or 5 on the North Carolina EOG/EOC assessments.

Table 3B. Number of high use XO laptop classes by grade by proficiency in reading and math for the 2013-14 school year

NUMBER OF HIGH USE XO CLASSES*	READING PROFICIENCY 4TH GRADE	MATH PROFICIENCY 4TH GRADE	READING PROFICIENCY 5TH GRADE	MATH PROFICIENCY 5TH GRADE
0	.34	.37	.25	.39
1	.50	0	.33	.50
2	0	.14	.31	.34
3	.22	.15	.32	.54
4	.18	.16	.19	.16
5	0	0	0	.14
6	.07	.29	.32	.50
7	.35	.53	.25	.39
8	0	0	.56	.63
9	0	0	.39	.22

*Note: One student took 14 classes and this outlier is not included in this table.

** Note: We include 4th and 5th grade proficiency levels, but omit 3rd grade proficiency in math and reading due to insufficient proficiency data for this grade level.

Table 3B shows no relationship between reading and math proficiency levels and the number of high use XO classes that the student attends among 3rd, 4th, and 5th grade students. Additionally, we examined if there were any statistically significant correlations between the number of high XO use classes attended by a student and academic proficiency, and found that none of the correlations was statistically significant at the .05 significance level.



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