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# Berkshire Wireless Learning Initiative Final Evaluation Report

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## Results

### Student Survey Results: Student Use of Technology in School

#### *Year 3 Student Survey Results*

Web-based surveys were administered in May and June 2008 to nearly all of the 1,800 BWLI students as well as over 1,100 comparison school students to provide an accurate appraisal of teaching and learning practices across the 1:1 laptop settings. Student surveys have also been collected across the 1:1 and comparison schools since the time of the first 7th grade student laptop deployment halfway through the 2005–2006 school year. Thus, the following student survey results detail the impact of 1:1 computing from the perspective of BWLI students at various points in the deployment of the BWLI program as well as in comparison to students in a non-1:1 setting.

The following tables report the frequency of technology using a 180-day scale corresponding to the 180 school days comprising one school year. In other words, technology use is measured on a 180 point scale where zero would mean that technology was never used and 90 would mean that technology was used on every other day, on average, during the 180 days comprising the academic year. The summary of students' technology use begins with Table S1, below, which illustrates the frequency of students' use of technology in the classroom during the 2007–2008 school year.

**Table S1: Number of school days students reported using technology in the CLASSROOM (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	111	79	110
Herberg Middle School	86	89	97
Reid Middle School	84	102	82
St. Mark/St. Joseph	90	137	3
<b>North</b>	<b>23</b>	<b>20</b>	<b>22</b>
<b>South</b>	<b>13</b>	<b>23</b>	<b>21</b>

Table S1 shows the average number of times students reported using technology in the classroom during the 2007–2008 school year (the third year of the BWLI implementation) across each of BWLI and comparison schools. As the table shows, the average use of technology varied across grade levels and across each school. Despite this variation across school and grade levels, some patterns of students' technology use are evident. For example, students across all grade levels reported a substantially more frequent use of technology in the BWLI classrooms than students at either comparison school where technology use generally occurred around 20 times per the year, or less than once per week. Across the BWLI schools, students' frequency of technology use varied more substantially but was typically found to be at least four times more frequent than in the non-1:1 laptop comparison schools.

Looking more closely at only the BWLI schools, 6th grade students generally reported somewhat less frequent use compared to grades 7 and 8 where students had longer access and greater experience using school laptops. However, this was not observed at the Conte school where the 7th grade students reported less frequent use than either grade 6 or 8. Conversely, grade 7 use was found to be greatest at the Reid school and at St. Marks. Clearly, the use of technology across the Pittsfield parochial schools (St. Mark serving grades 6th and 7th and St. Joseph serving 8th) varied substantially with St. Mark 7th graders reporting the most frequent 2008 average use (137 times per year) but St. Joseph 8th graders reporting the lowest frequency of use for any reporting school (3 times per year).

In addition to technology use in the classroom, technology use in non-classroom school settings was also examined in the student survey for the 2007–2008 school year. Table S2 shows the average number of times students from BWLI and comparison schools reported using technology in a computer lab during the 2007–2008 school year.

**Table S2: Number of school days students reported using technology in a COMPUTER LAB (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	8	3	0
Herberg Middle School	25	21	9
Reid Middle School	7	23	12
St. Mark/St. Joseph	57	61	0
<b>North</b>	<b>50</b>	<b>30</b>	<b>18</b>
<b>South</b>	<b>20</b>	<b>19</b>	<b>19</b>

Table S2 displays the average number of times students reported using technology in computer labs during the 2007–2008 school year across both BWLI and comparison schools. Students in BWLI schools generally reported less frequent use of technology in computer labs compared to the frequency of use in the BWLI classrooms (reported above in Table S1). In other words, students in BWLI settings typically use technology more frequently in the classroom than in school computer labs. However, students reported wide variation in the frequency of their technology use in computer labs across each of the BWLI schools and each grade level. For example, Conte 8th graders and St. Joseph 8th graders reported no use of technology in a computer lab while St. Mark's 7th grade students reported the most frequent use with an average of 61 times per school year, or once or twice a week.

In general, 8th grade students used technology in computer labs less frequently than students in the lower grades at the 1:1 schools. In addition, students also reported the frequency of their technology use in the school library as summarized below in Table S3 for both the BWLI and comparison schools.

**Table S3: Number of school days students reported using technology in the LIBRARY (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	1	1	1
Herberg Middle School	17	16	11
Reid Middle School	6	8	7
St. Mark/St. Joseph	17	16	22
<b>North</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>South</b>	<b>10</b>	<b>9</b>	<b>4</b>

Table S3 shows the average number of times students reported using technology in the school library during the 2007–2008 school year across both BWLI and comparison schools. Overall, BWLI students generally reported less frequent use of technology in the school library compared to classroom and computer lab use. Across the BWLI settings, use of technology in the library occurred most frequently at the Herberg school, as well as in the two parochial schools.

Looking cumulatively across Tables S1, S2, and S3 we can see that the majority of BWLI students used technology for at least some portion of every day during the 2007–2008 school year. Although some use was reported to occur in the school library and in computer labs, the majority of BWLI students' technology use occurred in the classroom. However, the preceding tables also show that there was substantial variation in technology use across grade levels at many schools. In addition, summarizing such results across grade levels allows for a more succinct examination student technology use, however, the fact that such summaries fail to demonstrate the variation reported across grade levels should be remembered. Figure S1 shows the average number of days students reported using technology during the 2007–2008 school year across for each of the BWLI and comparison schools.

**Figure S1: Average number of school days students reported using technology (2007–2008 school year)**

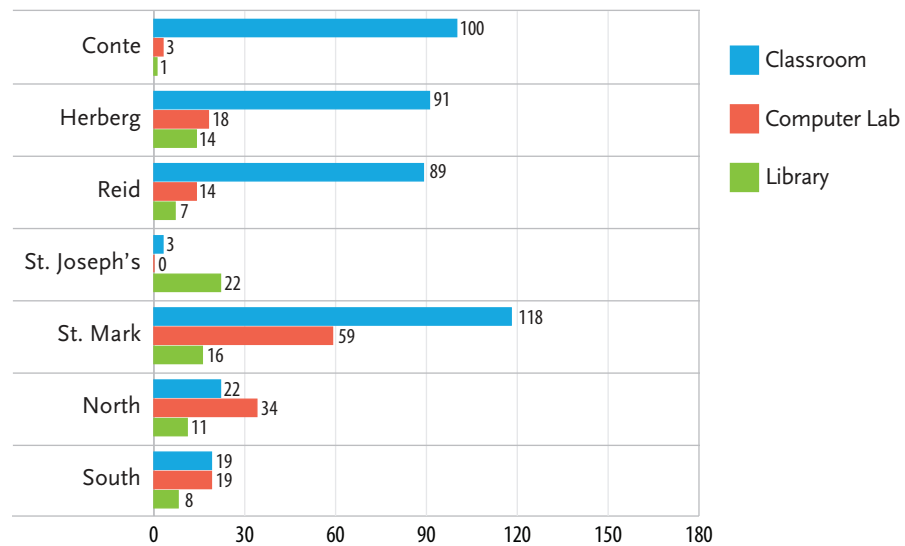


Figure S1 shows the average number of days students reported using technology in their classrooms, in school computer labs, and in the school library during the 180 potential days of the 2007–2008 school year. In the figure, students' use of technology in the classroom is displayed by blue horizontal bars while computer use in the computer lab and library are represented by red and green bars, respectively. Looking across the BWLI schools during the 2007–2008 school year, St. Mark students reported the most frequent average use of computers in school while St. Joseph 8th graders reported the least.

An analysis of variance between the BWLI students' and comparison school students' Year 2 survey results showed that the greater frequency of BWLI student technology use was statistically significant "in the classroom" ( $F=1235.1$ ;  $\text{Sig.} < .0005$ ) and "in the computer lab" ( $F= 49.9$ ;  $\text{Sig.} < .0005$ ) but not "in the library" ( $F=.03$ ;  $\text{Sig.} .859$ ) compared to the non-BWLI students. In other words, the frequency of technology use in classrooms and in computer labs was so much greater in the BWLI settings than comparison settings that the difference could not be reasonably expected from chance. However, the difference between the average frequency of students' computer use in the library was not statistically significant between the BWLI and comparison students.

The next series of Tables (S4–S11) further explores students' use of technology in four primary subject areas across the BWLI and comparison schools during the 2007–2008 school year.

**Table S4: Number of school days STUDENTS reported using a computer in READING/ELA class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	54	16	66
Herberg Middle School	49	56	65
Reid Middle School	64	43	39
St. Mark/St. Joseph	48	108	0
<b>North</b>	<b>12</b>	<b>7</b>	<b>17</b>
<b>South</b>	<b>19</b>	<b>12</b>	<b>24</b>

Table S4 shows the average number of times students reported using technology in their Reading/English Language Arts classes during the 2007–2008 school year for both BWLI and comparison schools. Despite a great deal of variation across the BWLI schools and across grade levels, BWLI students generally reported using computers in their Reading/ELA classes with much greater frequency than students in the two comparison schools during the 2007–2008 school year. As the table shows, each BWLI school exhibited different patterns of computer use across each of the different grade levels. For example, 7th grade Conte students reported the least frequent use of computers in Reading/ELA class compared to the other BWLI 7th grades, (16 times per year, or about once every 10 days) but exhibited the most frequent Reading/ELA use of any 8th grade class (66 times per year). Students in 6th and 7th grade at St. Mark reported using computers over 48 and 108 times per year respectively in their Reading/ELA classes, but 8th graders at St. Joseph reported the virtually no use whatsoever, with an average below once per year. Relatively less variation across grade levels was reported for Reid, Herberg, and the comparison schools.

In addition to reporting how frequently they themselves used technology during the 2007–2008 school year across each of their primary subject areas, students also estimated the frequency that their teachers used technology in their classes during this same time period. For example, Table S5, below, displays the average number of school days students reported that their teachers used a computer in their Reading/English Language Arts classes during the 2007–2008 school year.

**Table S5: Number of school days students reported their TEACHER using a computer in READING/ELA class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	115	51	74
Herberg Middle School	110	101	106
Reid Middle School	84	107	106
St. Mark/St. Joseph	65	106	0
<b>North</b>	<b>86</b>	<b>114</b>	<b>107</b>
<b>South</b>	<b>108</b>	<b>140</b>	<b>113</b>

Unlike the Reading/ELA student use presented previously in Table S4, Table S5 shows that teachers' use of technology in Reading/ELA did not vary as considerably across the BWLI schools and different grade levels within the schools. The large differences observed for student use between the BWLI and comparison schools was not observed for teachers' computer use in Reading/ELA classes where comparison school teachers made widespread use of technology in their teaching, often more frequently than the BWLI teachers.

As the table above shows, most BWLI schools again exhibited different patterns of computer use across each of the different grade levels. For example, Conte 7th grade teachers were reported to use computers in Reading/ELA class less frequently than the other BWLI 7th grade teachers, (51 times per year) but exhibited the most frequent Reading/ELA use of any 6th grade class (115 times per year). Again, similar to the student use, teachers in 6th and 7th grade at St. Mark were reported to regularly use computers in their Reading/ELA classes, but 8th grade students at St. Joseph reported their Reading/ELA teachers rarely, if ever, used a computer with their class during the 2007–2008 school year. Looking at the Pittsfield public schools, relatively little variation was reported at Herberg and Reid across grade levels. Table S6 continues the exploration of students' use of technology during the second year of the BWLI implementation, showing the average number of school days students reported using a computer in Math class (2007–2008 school year).

**Table S6: Number of school days STUDENTS reported using a computer in MATH class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	32	23	28
Herberg Middle School	40	31	27
Reid Middle School	37	62	8
St. Mark/St. Joseph	5	6	0
<b>North</b>	<b>4</b>	<b>9</b>	<b>7</b>
<b>South</b>	<b>12</b>	<b>14</b>	<b>7</b>

Like the Reading/ELA results, a great deal of variation across the BWLI schools as well as across grade levels was observed. Despite this variation, BWLI students typically reported using computers in their Math classes with greater frequency than students in the two comparison schools over the course of the 2007–2008 school year. As the table shows, each BWLI school exhibited different patterns of computer use across each of the different grade levels. For example, Reid students reported the most frequent use of computers in Math class compared to the other BWLI 7th grades (62 times per year, or about every third day), but exhibited substantially less use in the 8th grade class (8 times per year). St. Joseph 8th graders again reported not using their computers in Math class while use in the 6th and 7th grades at St. Mark was sporadic and comparable to students in the comparison schools who generally reported using computers in math between 4 and 14 times during this same period. Table S7, below, displays the average number of school days students reported that their teachers used a computer in their Math classes during the 2007–2008 school year.

**Table S7: Number of school days students reported their TEACHER using a computer in MATH class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	123	96	73
Herberg Middle School	113	113	87
Reid Middle School	66	98	81
St. Mark/St. Joseph	31	46	0
<b>North</b>	<b>74</b>	<b>112</b>	<b>96</b>
<b>South</b>	<b>103</b>	<b>126</b>	<b>91</b>

Like the other patterns of Year 2 student and teacher computer use, Table 11 shows that teachers' use of technology in Math classes varied across the BWLI schools as well as across different grade levels within the schools. Like the Reading/ELA results, the relationship between students' and teachers' use of technology within Math classes was found to be positive, indicating that classrooms where teachers regularly used technology were often classes where students used technology. However, the large differences observed between the BWLI and comparison student use of computers was not shared for teachers' computer use in Math classes where the comparison school teachers actually made widespread use of technology in their teaching, often more frequently than the BWLI teachers.

As Table S7 displays, many of the BWLI schools again exhibited different patterns of computer use across each of the different grade levels. For example, Conte 6th grade teachers were reported to use computers in Math class more than the other BWLI grade levels, (123 times per year). Teachers of 6th and 7th grade at St. Mark were reported to regularly use computers in their Math classes, but much less frequently than at the other BWLI schools. However, 8th grade students at St. Joseph reported their Math teachers again used their computers so rarely during the 2007–2008 school year that the school average was below once per year.

Table S8 continues the exploration of students' use of technology during the second year of the BWLI implementation, showing the average number of school days students reported using a computer in Social Studies class (2007–2008 school year).

**Table S8: Number of school days STUDENTS reported using a computer in SOCIAL STUDIES class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	7	27	40
Herberg Middle School	39	41	66
Reid Middle School	24	123	74
St. Mark/St. Joseph	47	86	3
<b>North</b>	<b>4</b>	<b>7</b>	<b>12</b>
<b>South</b>	<b>7</b>	<b>12</b>	<b>6</b>

Like the results for the other subject areas, there was again substantial variation in the frequency of Social Studies computer use across the BWLI schools and across grade levels within each 1:1 school. Despite this variation, BWLI students typically reported using computers in their Social Studies classes with much greater frequency than students in the two comparison schools over the course of the 2007–2008 school year. As Table S8 shows, each BWLI school exhibited somewhat different patterns of computer use across different grade levels. For example, the Conte and Herberg results show an increasing use of computers in Social Studies as students reach the upper grade levels. A different pattern emerged at Reid where students reported the most frequent use of computers

in Social Studies class occurred in the 7th grade classes, the greatest for any school cohort (123 times per year). Students at the comparison schools reported using computers in Social Studies between 4 and 12 times during the year, on average. Table S9, below, displays the average number of school days students reported that their teachers used a computer in their Social Studies classes during the 2007–2008 school year.

**Table S9: Number of school days students reported their TEACHER using a computer in SOCIAL STUDIES class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	80	37	62
Herberg Middle School	94	98	118
Reid Middle School	52	131	118
St. Mark/St. Joseph	49	129	35
<b>North</b>	<b>56</b>	<b>107</b>	<b>107</b>
<b>South</b>	<b>93</b>	<b>126</b>	<b>102</b>

For most grade levels and schools, the results show that teachers used computers more frequently than their students in Social Studies (Table S9), which was especially true in the two comparison schools. However, like the results in other subject areas, the relationship between students' and teachers' use of technology within Social Studies classes was positive, indicating again that classrooms where teachers regularly used technology were often classes where students used technology. As such, many of the patterns observed for students' use of computers in Social Studies classes (Table S8) were similar across the different grade levels at BWLI schools.

Like the other results of Year 3 student and teacher computer use, Table S9 shows that teachers' use of technology in Social Studies classes varied across the BWLI schools as well as across different grade levels within the schools. However, the large differences observed for student use between the BWLI and comparison schools was not shared for teachers' computer use in Social Studies classes where comparison school teachers made widespread use of technology in their teaching. Unlike the other subject areas, students reported their St. Joseph teachers did use their BWLI laptops for Social Studies classes during the 2007–2008 school year (35 times on average), but still substantially less than the averages reported across the other BWLI (and comparison school) 8th grades.

Table S10 completes the exploration of students' use of technology during the second year of the BWLI implementation (2007–2008 school year) across primary subject areas showing the average number of school days students used a computer in Science class.

**Table S10: Number of school days STUDENTS reported using a computer in SCIENCE class (2007–2008 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	56	38	58
Herberg Middle School	23	64	26
Reid Middle School	20	30	54
St. Mark/St. Joseph	29	58	2
<b>North</b>	<b>7</b>	<b>6</b>	<b>9</b>
<b>South</b>	<b>5</b>	<b>12</b>	<b>6</b>

BWLI students typically reported using computers in their Science classes much more frequently than students across the two comparison schools during the course of the 2007–2008 school year. As Table S10 shows, each BWLI school exhibited somewhat different patterns of computer use across different grade levels. For example, the Conte students again reported the least use at 7th grade while the opposite was reported at Herberg where 7th grade use was most frequent. Reid showed an increase in use over the three grade levels. Students at the two comparison schools generally reported infrequent use of computers in Science (between 5 and 12 times during the year, on average).

Table S11, below, shows the average number of school days students reported that their teachers used a computer in their Science classes during the 2007–2008 school year.

**Table S11: Number of school days students reported their TEACHER using a computer in SCIENCE class (2006–2007 school year)**

	6 <sup>th</sup> Grade	7 <sup>th</sup> Grade	8 <sup>th</sup> Grade
Conte Middle School	109	73	87
Herberg Middle School	97	99	92
Reid Middle School	48	91	94
St. Mark/St. Joseph	42	95	3
<b>North</b>	<b>55</b>	<b>98</b>	<b>99</b>
<b>South</b>	<b>91</b>	<b>142</b>	<b>99</b>

For nearly all grade levels and schools, Table S11 shows that BWLI teachers used computers with a fairly similar frequency as Science teachers in the two comparison schools during the final year of the BWLI implementation. However, like the other subject areas results, Table S11 shows that teachers' use of technology in Science classes varied across the BWLI schools as well as across the different grade levels within each schools. Conte 6th grade science teachers had the most frequent use of the BWLI grades and schools (109 days per year), however, the 7th grade science teachers at the South comparison school used technology nearly every day (142 days per year). At St. Mark, teachers were reported to use computers in science classes substantially more frequently in 7th grade than grades 6 while St. Joseph teachers again were reported to only very rarely use technology in class.

Tables S4 through S11 explore the average frequency of computer use across the core curriculum for BWLI and comparison school students and teachers during the second year of the BWLI implementation. Across nearly all BWLI schools, there was variation reported across grade levels in how frequently students and teachers within a school used their BWLI laptops. Such patterns and variation in computer use illustrates the complicated nature of summarizing and presenting complex technology use data.

**Figure S2: Average number of school days students reported using technology by primary subject area (2007–2008 school year)**

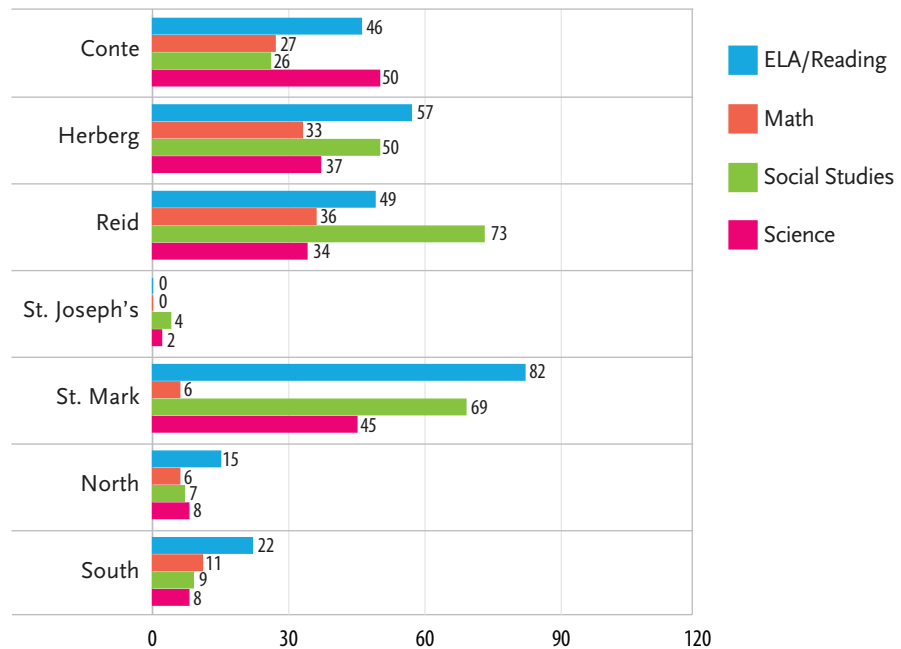


Figure S2 displays the average number of days students reported using computers across four primary subject areas during the potential 180 school days of the 2007–2008 school year. In the above figure, students' frequency of computer use is represented by four horizontal bars corresponding to the four surveyed subject areas. A number of interesting and noteworthy features are

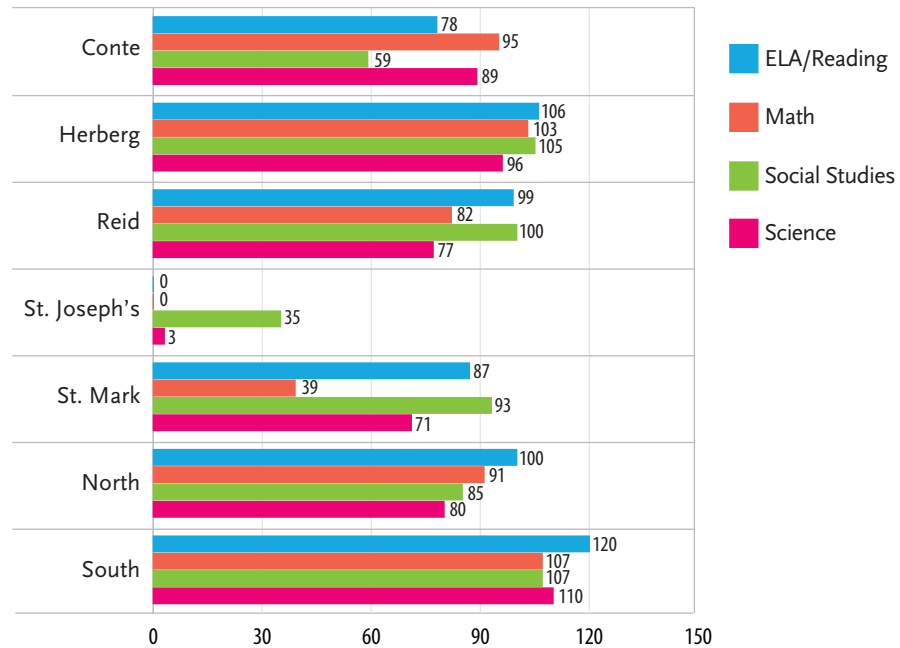
prominent in Figure S2. First, there is substantial variability in the frequency of use across subject areas within most of the BWLI schools. For example, students across all grade levels at St. Mark reported using their computers over 80 times in ELA and nearly 70 times Social Studies classes during the 2007–2008 school year while only 6 times in their Math classes. Looking across the schools for subject area trends, we find that in two of the five BWLI schools, students used computers in social studies class more than other subjects, while students at Conte reported using computers the least social studies. In other words, no single subject area received universal high use at more than two BWLI schools, suggesting that factors within each school play a larger role in the adoption and student use of technology than factors related to individual subject areas. Despite this variation, student use of technology in Math class was reported less frequent than most other subjects in most of the BWLI settings.

Looking cumulatively across the BWLI school averages during the 2007–2008 school year, St. Joseph students reported the least frequent use with the average St. Joseph student reporting a total of 6 instances of computer use across these primary subject areas during the 2007–2008 school year. Students at St. Mark's School reported the most frequent cumulative use with the average student reporting that they had used a computer across these four classes on 202 occasions during the school year. Close behind, the average Reid students reported 192 cumulative uses of a computer in these subjects across this same period while Herberg and Conte students reported 177 and 149 respective instances of computer use. What this means is that, on average, BWLI students used their laptop computers on a daily or slightly greater-than-daily basis during the 2007–2008 school year.

When compared to the students in the two matched comparison schools, BWLI students typically reported using technology four or five times more frequently during the 2007–2008 school year, although it is important to consider the variation across and within the 1:1 schools. The difference between the BWLI students and comparison school students' Year 3 survey results were tested for statistical significance using an analysis of variance. The results of the analysis of variance showed that the difference between the BWLI and comparison students use of technology was statistically significant ( $p < .0005$ ) across all surveyed subject areas.

In addition to the examination of cumulative student technology use across primary subject areas during the 2007–2008 school year, students also reported their teachers' frequency of technology use in the classroom. Figure S3 shows the average number of school days teachers used technology with their classes as reported by their students during the 2007–2008 school year.

**Figure S3: Average number of school days teachers used technology with their classes as reported by their students (2007–2008 school year)**



In the above figure, teachers' reported frequency of computer use is represented by four vertical bars corresponding to the four surveyed subject areas. Looking cumulatively across the subject areas, we can see that teachers' reported use of technology fluctuated less than students' use of technology across subject areas and across schools. In other words, compared to the student use results in Figure S2, there is less variability in teachers' frequency of technology use across subject areas than was observed for students' use. In addition, teachers typically used computers substantially more frequently than their students did during the 2007–2008 school year. This increased use for teachers was a particularly prominent result in both of the comparison schools where teachers' frequency of technology often averaged higher than many BWLI schools. In fact, when summing the results across all subject areas, only Herberg teachers averaged more frequent technology use than the teachers in the two matched comparison schools where students reported an average of 356 (North) and 444 (South) instances where their primary subject teachers used a computer during the 2007–2008 school year. St. Joseph students reported the least frequent cumulative use for their teachers with only 38 instances.

Although the difference between the BWLI school and comparison school tallies show that, on average, many BWLI teachers cumulatively used technology less than their comparison school colleagues, individual student data compared from BWLI and comparison school results for each subject area provides a more precise picture.

For each of the surveyed primary subject areas, analysis of variance testing was performed on the frequency of teachers' computer use as reported by BWLI and comparison school students dur-

ing the 2007–2008 school year. In Reading/ELA, math, and science classes, the results showed that BWLI teachers had used computers statistically less frequently than the comparison group teachers ( $F=21.5$ ;  $p < .0005$ ,  $F=9.1$ ;  $p = .003$ , and  $F= 10.5$ ;  $p=.001$  respectively). However, the differences between the BWLI and comparison school social studies teachers did not yield statistically significant results. In other words, the difference between 1:1 and non-1:1 teachers' computer use was no greater than chance for social studies teachers during the 2007–2008 school year.

In the following tables, student technology use is examined in greater detail. Given the fluctuations in computer use across grade levels, student results are presented separately across grade levels and schools in Tables S12 through S15. Table S12, below, examines 6th grade BWLI and comparison school students' technology use in school during the 2007–2008 school year for a wide variety of different educational technology applications.

**Table S12: Number of times during the 2007–2008 school year that 6<sup>th</sup> grade students reported using a variety of specific technology applications in school**

	Conte	Herberg	Reid	St. Mark	North	South
<b>In the last year how often did you use a computer in school to:</b>						
Send and receive email	0	11	29	0	2	3
Write first drafts	28	33	38	16	15	10
Edit papers	22	37	33	28	16	15
Create graphs or tables	16	11	13	11	4	2
Find information on the Internet	99	75	69	106	35	19
Create a PowerPoint presentation	35	11	11	6	4	2
Play computer games	71	49	51	25	21	10
Work with spreadsheets/databases	10	9	13	4	4	3
Solve problems	33	27	16	14	6	8
Analyze data	20	16	8	13	5	4
Take a test, quiz, or practice test	34	27	30	4	4	10
Take notes in class	41	16	22	19	4	8
Present information to the class	22	16	15	25	4	4
Keep track of dates and schedule/calendar	17	20	13	1	3	2
Access a teacher's website	104	45	43	23	3	5
Email a teacher	5	13	28	0	1	2
Help a student fix a computer problem	14	12	9	12	12	9
Help a teacher fix a computer problem	16	7	4	9	5	5

Table S12 displays the number of times during the 2007–2008 school year that 6th grade students reported using a variety of specific technology uses in school. Across the 6th grade classes, it is evident from Table S12 that students across the BWLI schools typically used technology for a wide variety of activities and with greater frequency than students at the comparison schools. An analysis of the variance between the BWLI and comparison school 6th grade students determined that the more frequent technology use exhibited by BWLI students represented a statistically significant difference ( $p < .001$ ) for all uses in Table S12 except using a computer to “help teacher fix a computer problem”. In other words, there was a substantially more frequent technology use in the BWLI 6th grade classes than in the comparison schools for nearly all measured technology uses.

Across the BWLI 6th grade classes, students generally reported that using a computer to “find information on the Internet”, “play computer games”, and “access a teacher’s website” were among the most frequently occurring uses. It should be noted that the typically negative association with computer games may not be warranted, given that the majority of the “games” played by the BWLI students on their computers were educationally based. However, there were substantial differences across patterns of 6th grade computer use at BWLI schools. For example, 6th grade students at St. Mark used computers more often than students at other schools to “find information on the Internet,” but rarely used their laptops to “keep track of dates and schedule/calendar” or “take a test, quiz or practice test”. Similarly, students at Conte used computers to “access a teacher’s website” more frequently than across other 6th graders at 104 days per year, 2 to 4 times the frequency at the other BWLI schools. Below, this same survey data is explored for 7th grade students at BWLI and comparison schools.

**Table S13: Number of times during the 2007–2008 school year that 7<sup>th</sup> grade students reported using a variety of specific technology applications in school**

	Conte	Herberg	Reid	St. Mark	North	South
<b>In the last year how often did you use a computer in school to:</b>						
Send and receive email	1	14	14	9	1	7
Write first drafts	16	34	32	51	11	12
Edit papers	11	34	35	54	11	16
Create graphs or tables	9	17	19	9	11	9
Find information on the Internet	72	96	90	143	34	40
Create a PowerPoint presentation	20	29	39	27	6	6
Play computer games	36	23	54	26	24	19
Work with spreadsheets/databases	8	11	9	11	6	6
Solve problems	24	31	25	32	9	13
Analyze data	8	16	17	18	7	8
Take a test, quiz, or practice test	15	20	36	70	11	21
Take notes in class	21	23	55	28	5	6
Present information to the class	14	28	24	25	5	7
Keep track of dates and schedule/calendar	11	16	15	16	4	4
Access a teacher's website	50	50	72	53	4	5
Email a teacher	2	10	18	5	2	5
Help a student fix a computer problem	7	9	10	11	17	9
Help a teacher fix a computer problem	4	5	6	6	8	5

Table S13 shows the number of times during the 2007–2008 school year that 7th grade students reported using a variety of specific technology uses in school. Across the 7th grade classes, it is clear from Table S13 that students in the BWLI schools typically used technology for a wide variety of activities and with greater frequency than students at the comparison schools. An analysis of the variance between the BWLI and comparison school 7th grade students' determined that the more frequent technology use exhibited by BWLI students represented a statistically significant difference ( $p < .05$ ) for all of the uses listed in Table S13 except using a computer to "help teacher fix a computer problem". In other words, like the 6th grade results, there was substantially more computer use in the BWLI 7th grade classes than in the respective comparison classrooms across nearly all measured technology uses.

Across the BWLI 7th grade classes, students again reported that using a computer to “find information on the Internet,” “access a teacher’s website” and “play computer games” were generally among the most frequently occurring uses. However, there were some substantial differences across patterns of 7th grade computer use at BWLI schools. For example, Reid 7th graders reported accessing a teacher’s web site on 72 days during the school year while this occurred about 50 times for each of the other BWLI schools. While using a computer to “find information on the Internet” was the most frequent use across all four BWLI schools, this activity was substantially more frequent at St. Mark’s (143 days per year). The frequency of “playing computer games” and “take a test, quiz or practice test” was also reported by students to widely vary across the BWLI schools. Below, this same survey data is presented for 8th grade students across BWLI and comparison schools.

**Table S14: Number of times during the 2007–2008 school year that 8<sup>th</sup> grade students reported using a variety of specific technology applications in school**

	Conte	Herberg	Reid	St. Joseph	North	South
<b>In the last year how often did you use a computer in school to:</b>						
Send and receive email	2	19	20	14	2	1
Write first drafts	26	30	31	3	10	11
Edit papers	23	36	39	3	12	12
Create graphs or tables	15	17	14	1	5	4
Find information on the Internet	88	89	85	16	34	33
Create a PowerPoint presentation	39	18	28	2	10	2
Play computer games	19	19	20	8	11	10
Work with spreadsheets/databases	9	6	7	0	4	2
Solve problems	22	26	21	0	4	5
Analyze data	13	15	10	0	4	3
Take a test, quiz, or practice test	25	22	19	1	6	6
Take notes in class	38	61	47	2	5	2
Present information to the class	24	19	18	1	8	3
Keep track of dates and schedule/calendar	9	15	8	0	2	2
Access a teacher’s web site	71	58	29	1	3	5
Email a teacher	2	21	16	0	2	0
Help a student fix a computer problem	7	13	13	7	13	9
Help a teacher fix a computer problem	2	5	3	1	8	5

Table S14 displays the number of times during the 2007–2008 school year that 8th grade students reported using a variety of specific technology uses in school. Table S14 shows that students across the BWLI schools used technology for a wide variety of activities and with greater frequency than students at the comparison schools. An analysis of the variance between the 8th grade BWLI and comparison school students showed that the more frequent technology use reported by BWLI students represented a statistically significant difference ( $p < .001$ ) across all uses. Like the student results for the 6th and 7th grade, the grade 8 results show that there was substantially more frequent technology use in the BWLI 8th grade classes than in the comparison schools for all measured technology uses.

Across the BWLI 8th grade classes, students generally reported that using a computer to “find information on the Internet”, “take notes in class” and “access a teacher’s website” were among the most frequently occurring student uses. However, like the results from grades six and seven, notable differences were observed across the patterns of 8th grade computer use in the BWLI schools. For example, the frequency of students using a computer to “access a teacher’s web site”, “take notes in class” and use email was reported to vary widely across the BWLI 8th grade classes.

Below, this same survey data is explored across all grade levels for BWLI and comparison students. Table S15 shows the number of times during the 2007–2008 school year that students reported using a variety of specific technology uses during the 2007–2008 school year.

**Table S15: Number of times during the 2007–2008 school year that students across all grade levels reported using a variety of specific technology applications in school**

	Conte	Herberg	Reid	St. Joe	St. Mark	North	South
<b>In the last year how often did you use a computer in school to:</b>							
Send or receive email	1	15	21	14	5	2	4
Write first drafts	23	32	34	3	37	13	11
Edit papers	19	36	36	3	43	14	14
Create graphs or tables	13	15	15	1	10	6	5
Find information on the Internet	86	87	81	16	127	35	30
Create a powerpoint presentation	32	19	26	2	18	6	3
Play computer games	41	30	42	8	26	19	13
Work with spreadsheets/databases	9	9	10	0	8	5	3
Solve problems	26	28	21	0	24	6	9
Analyze data	14	16	12	0	16	5	5
Take a test, quiz, or practice test	24	23	28	1	42	6	12
Take notes in class	34	35	42	2	25	4	5
Present information to the class	20	21	19	1	25	5	5
Keep track of dates and schedule/ calendar	12	17	12	0	10	3	3
Access a teacher's website	73	51	48	1	40	3	5
Email a teacher	3	15	21	0	3	1	2
Help a student fix a computer problem	9	11	10	7	11	13	9
Help a teacher fix a computer problem	5	6	4	1	7	6	5

Summarizing the grade-by-grade analyses of student use presented in Tables S12, S13, and S14, this table represents thousands of students' survey responses to provide some estimate of the overall frequency of these specific types of technology across the five BWLI schools and the two comparison schools. As Table S15 shows, BWLI students used technology across a wide variety of applications and with substantially greater frequency than students in the comparison schools. Again, like the previously presented results and the individual grade level comparisons, there was often substantial variation in the frequency of technology use across the five BWLI schools.

When looking at the cumulative results across all of the technology use categories in Table S15, Herberg, Reid, and St. Mark students exhibited the highest frequency of specific technology uses per student, trailed slightly by Conte students. St. Joseph students reported the least frequent use of technology of any school, including the two comparison schools where students had limited technology access.

By far, the most frequently reported technology use at both BWLI and comparison schools was using a computer “to find information on the Internet”. Other frequent uses of technology in the 1:1 settings included using a computer to: “access a teacher’s web site”, “play computer games”, “take notes in class” and “edit papers using a computer”. Some of the least frequent in-school technology uses during the 2007–2008 school year included were to “help a teacher fix a computer problem,” “work with spreadsheets or databases,” “email a teacher,” and “help a student fix a computer problem.”

### ***Comparing Student Use Over Time***

Up until now all of the student survey data examined in this report explored the differences between patterns of technology use across grade levels, across subject areas, and across the BWLI and comparison schools collected during the third and final year of BWLI deployment (2007–2008 school year). However, student data was collected in BWLI and comparison schools on three occasions before the 2007–2008 school year which allows for further exploration of how computer use and teaching and learning practices have changed since the students began using laptops across the BWLI schools.

Before the data from past survey administrations can be compared to past results, survey data from the January 2006 7th grade survey and from the school wide May 2006 survey needed a mathematical transformation to conform to the technology use scale used in the 2007 and 2008 surveys. This transformation is the result of a change in the way the student survey collected information about students’ use of computers. Specifically, a methodological improvement was made to the May/June 2007 student survey, which provided much broader and more realistic response options for students to describe the frequency of their technology use both at home and at school.

In the pre-2007 student surveys, the student survey response options consisted of five discrete categorical response options: “never”, “every couple of months”, “once a month”, “once a week”, and “everyday”. When the data was analyzed a numeric value was assigned to each response option such that “never” was coded as a zero and “every day” was coded as four. This common practice of assigning linear numeric values to survey responses allows for empirical analyses across schools and over time. However, from a measurement point of view, the values assigned to the preceding surveys were somewhat arbitrary (with the exception of zero which indicated that a student *never* used technology). Although nearly all educational research has employed the use of such discrete categorical response options on surveys, the Boston College researchers recognized an opportunity to provide students with a more expansive (and more accurate) means of reporting the frequency of their computer use. Custom designed Adobe Flash sliding scales were imbedded within the online student survey beginning with the May/June 2007 surveys. The “sliding scales” presented survey respondents with a visually accurate scale where they could quickly select the frequency of technology use on a 180 point scale representing the potential 180 days in the school year. In earlier pilot testing for these new scales, the Boston College researchers learned that responses on such scales were most accurate when the original categorical response option text (i.e. “never”, “every couple of months”, “once a month”, etc.) was presented in addition to the numeric equivalent (0–180) on screen (<http://nimbletools.com/>).

With these Adobe Flash response options, students can select any value on a 180-point scale using their mouse to drag an arrow across a sliding scale. In every case, the same survey questions and categorical response names were presented, but the May 2007 and May 2008 surveys provided students with more realistic and accurate response options. However, to compare past categorical survey data with data collected using the full 180-point scale, the old data must first be converted to the 180 point scale. Assuming that the 2007–2008 school year equaled 180 days, or 9 months, or 36 weeks, the old five point scale was transposed to a 180-point scale to provide an equivalent estimate of computer use across survey administrations. This approach results in a 180-point scale where 0 represents a teacher *never* using technology and 180 represents *everyday* use of technology. Table S16, below, shows the conversion chart used to transpose the January 2006 and May 2006 student data onto the 180-point technology use scale.

**Table S16: Conversion table for transposing the January 2006 and May 2006 student survey data to 180-point scale**

2006 raw data	Response Choice	Assigned value (2007 and 2008 analysis)
0	Never	0
1	Every couple of months	5
2	Once a month	9
3	Once a week	36
4	Every day	180

This 180-point scale provides easier interpretation and presentation of summary data because the difference between the numbers actually reflects a real difference in the amount of attribute measured (Glass & Hopkins, 1996). However, the accuracy attributable to the May 2007 and May 2008 data (bolstered as well by the excellent Year 2 response rates) does not extend to the prior student survey data, despite the fact it can be presented on a 180-point scale. However, the figures and analyses presented below provide a detailed and accurate representation of students technology use across each grade before laptops were deployed and again at the end of the 2007–2008 school year.

In the following results, summaries of BWLI and comparison school students' frequency of various technology uses are reported over multiple survey administrations. Given that the BWLI student laptop deployment was staggered across grade levels, the corresponding pre- and post- laptop student surveys followed the same schedule. Thus, the figures below are presented for individual grade levels and subject areas before whole school summaries are presented. The individual trends across schools for pre- and post- student laptop averages are interesting in that they allow a more direct comparison across the BWLI schools and comparison schools than had been possible when only Year 1 data was available. For example, Figure S4 shows the average number of days students used technology in their classrooms across past survey administrations.

In addition to providing a summary of the technology use in the classroom, Figure S4 also displays the overall structure of the available longitudinal data. Only 7th graders completed the first January 2006 survey as the first year of the BWLI program provided laptop computers only to grade seven students beginning in early 2006. At the end of the 2005-2006 school year students across all grade levels completed a survey. So, the May 2006 survey is a pre-laptop survey for 6th and 8th grade students but reflects approximately four months of 7th graders in 1:1 classrooms. It was an unfortunate coincidence that no 7th grade students from either comparison school completed the May 2006 survey due to a scheduling error at the end of the 2005–2006 school year. However, 7th grade pre/post comparisons can be made using the subsequent June 2007 and June 2008 surveys collected from both BWLI and comparison school 7th graders.

**Figure S4: Average number of days students reported using technology in their classrooms across past survey administrations**

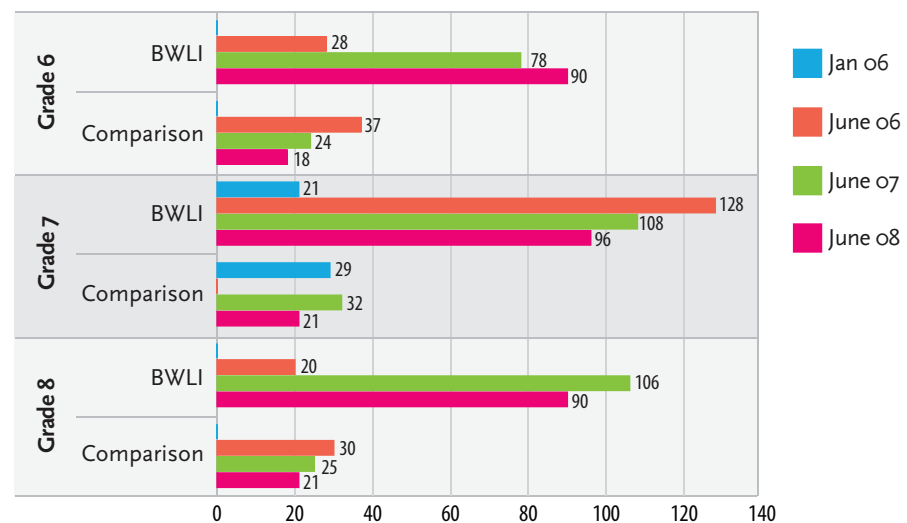


Figure S4 displays the average number of days students reported using technology in their classrooms across all past survey administrations (January 2006, June 2006, June 2007, and June 2008). Overall, it is clear from viewing Figure S4 that there were substantial increases in the frequency of technology use for BWLI students between their pre-laptop surveys (January 06) and their post-laptop surveys (June 06). This increased use is found across all grade levels for BWLI students while in-class technology use in the comparison schools changed little. For example, in grades 7 and 8 there was almost a five-fold increase in the frequency of technology use in the classroom reported by the BWLI students while 6th graders reported a less substantial increase between survey administrations. After the initial increase in use, Grade 7 and 8 witnessed a gradual decrease in the frequency of use with subsequent survey administrations.

Figure S5 begins a grade by grade analysis of students' reported technology use since the beginning of the BWLI program with a summary of the number of days that BWLI and comparison 6th grade students reported using computers across their primary subject classes.

**Figure S5: Number of days over the BWLI implementation years that BWLI and comparison 6<sup>th</sup> grade students reported using computers across their primary subject classes**

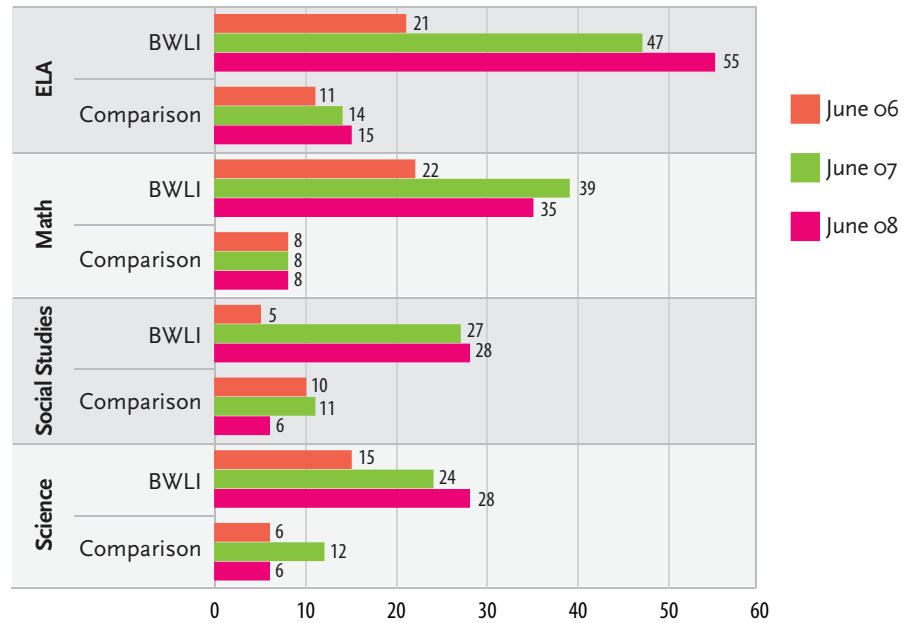
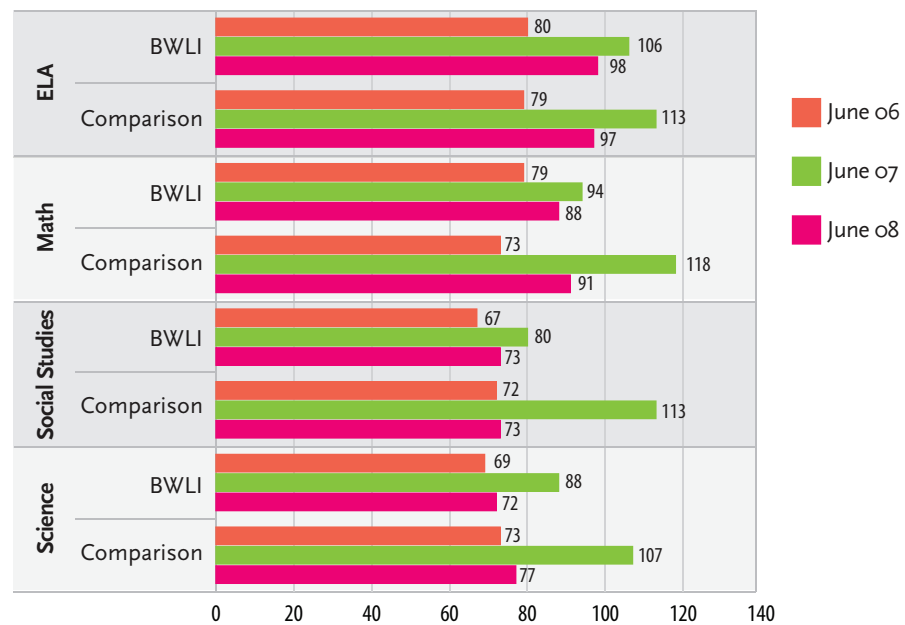


Figure S5 shows the number of days that 6th grade BWLI and comparison students reported using computers in their primary subject classes. Specifically, average 6th grade students' use of technology across Reading/ELA, Social Studies, Math, and Science classes are compared from June 2006 (when no 6th grade students had laptops) to the June 2007 survey (when 6th grade BWLI students had their 1:1 laptops for approximately five months) and June 2008 survey (when 6th grade students had 1:1 laptops for the full school year).

Accordingly, the average 6th grade students' use of technology in the BWLI settings increased dramatically across all subject areas since the first student surveys, particularly when compared to comparison school averages which little changed. From Year 2 to Year 3, ELA and Science student use continued to increase in the BWLI settings while use stayed about the same in Social Studies and decreased slightly in Math. There were fewer changes in the comparison schools. Additionally, BWLI grade 6 students continued to use technology more in ELA than other classes, while the differences between subjects was not as great in the comparison schools.

Figure S6, below, continues this exploration of pre/post 6th grade computer use by exploring the number of days that BWLI and comparison 6th grade teachers were reported by their students to be using computers across their primary subject classes across three different administrations of the student survey.

**Figure S6: Number of days in the school year that BWLI and comparison students reported that their 6<sup>th</sup> grade teachers used computers in their primary subject classes**



It should be noted here that all grade levels of BWLI teachers were provided their own laptops early in the 2005–2006 school year so that all three survey administrations represent learning settings where teachers in the BWLI schools had laptop computers. Thus, Figure S6 illustrates the difference between teachers' use of technology with their students during a time period when student access to technology increased at the BWLI schools (June 07 and June 08 surveys) but not in the comparison schools.

Although BWLI teachers increased the frequency of technology use in every surveyed subject area, the differences over time in 6th grade teachers' use of technology presents a more complicated story than the 6th grade student results. For example, results from the June 2006 survey show quite similar patterns and frequency of technology use across both BWLI and comparison teachers. Looking at the June 2007 survey results, after 6th grade BWLI students had access to laptops for about half the 2006–2007 school year, we observe a modest increase in the frequency of technology use across all subject areas in the BWLI setting. However, increases in the 6th grade comparison schools during the 2006–2007 were larger than those reported in the BWLI schools. Comparing the BWLI teachers' and comparison school teachers' use of technology collected during the June 2007 survey, we see that BWLI teachers used technology less than comparison school teachers in every

surveyed subject area. Although, these differences are generally small they show that comparison group teachers were frequently using technology with students across all primary subject areas during the 2006–2007 school year.

Although the frequency of 6th grade teachers use of technology continued to be widespread across the curriculum during the third and final year of the BWLI implementation, the average frequency of teacher use in both BWLI and comparison settings nearly dropped back to the original June 2006 averages. For every subject, teachers reported frequency of technology use during Year 3 (June 2008) were still at least somewhat greater than recorded in the 6th grade pre-1:1 student laptop survey (June 06).

**Figure S7: Number of days in the school year that BWLI and comparison 7<sup>th</sup> grade students reported using computers across their primary subject classes**

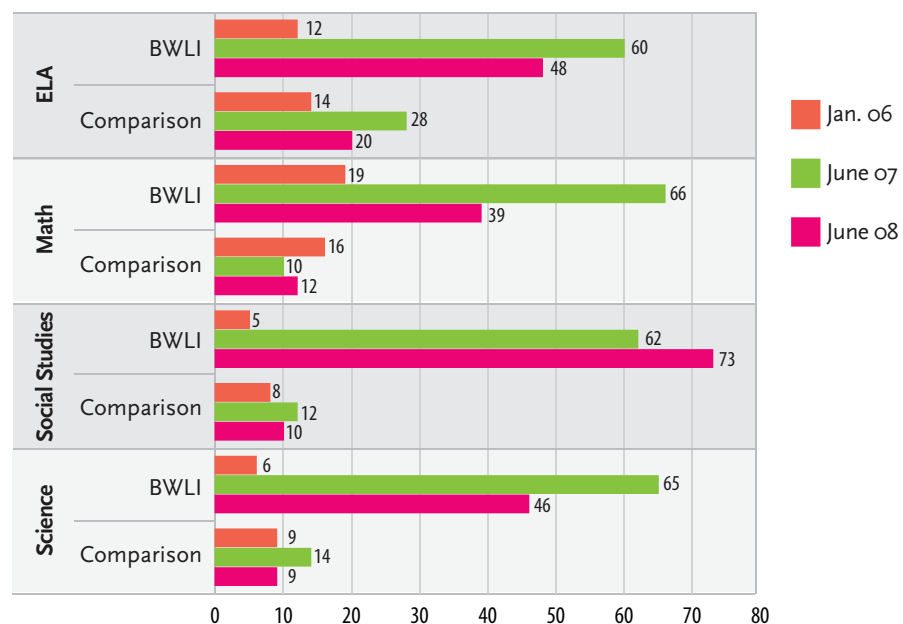


Figure S7 shows the number of days that BWLI and comparison school 7th grade students reported using computers in their primary subject classes. Specifically, average 7th grade student use of technology in Reading/ELA, Math, Social Studies, and Science classes from the January 2006 survey (before 7th grade students had been issued laptops) is compared to the June 2007 results (after BWLI 7th grade students had 1:1 laptop access for nearly a full school year) and the June 2008 survey results (after two years of 1:1 student computing in 7th grade).

The average 7th grade students' use of technology in the BWLI settings peaked across nearly subject areas during the second year of the BWLI program, except Social Studies where student use at BWLI schools peaked during Year 3 (June 2008). Despite the decrease in student use observed in Year 3 of the implementation, the use of technology at BWLI schools was still substantially greater

than at the comparison schools. For example, looking at only the January 2006 results (pre-1:1 laptops), we see that the BWLI 7th grade students reported using computers about twenty times per year in their Math classes, while 12 times per year in their Reading/ELA classes and approximately 5 times in Social Studies and Science. Comparison students during this same period report quite similar computer use in their classes. Looking to the June 2007 7th grade survey results (post- 1:1 laptops), BWLI students reported widespread and dramatic increases in the frequency of their computer use, with the most frequent use now reported in Math and Science classes. More specifically, 7th grade BWLI students reported using computers 60 or more times per year in each surveyed subject area with the largest proportional increases observed for Science and Social Studies class averages. In the comparison schools, such substantial increases were not observed, although the frequency of computer use in Reading/ELA classes doubled between the January 2006 and June 2007 surveys. In the June 2008 survey (Year 3), BWLI students report using computers most frequently in social studies classes where use continued to increase, while math and science classes witnessed the greatest decrease in use. Comparison schools had relatively little change from Year 2 (June 2007) to Year 3 (June 2008) surveys.

Figure S8, below continues this exploration of pre/post 7th grade computer use by exploring the average number of days that BWLI and comparison 7th grade teachers were reported to use their computers across their primary subject classes in all three school years.

**Figure S8: Number of days in the school year that BWLI and comparison students reported that their 7<sup>th</sup> grade teachers used computers in their primary subject classes**

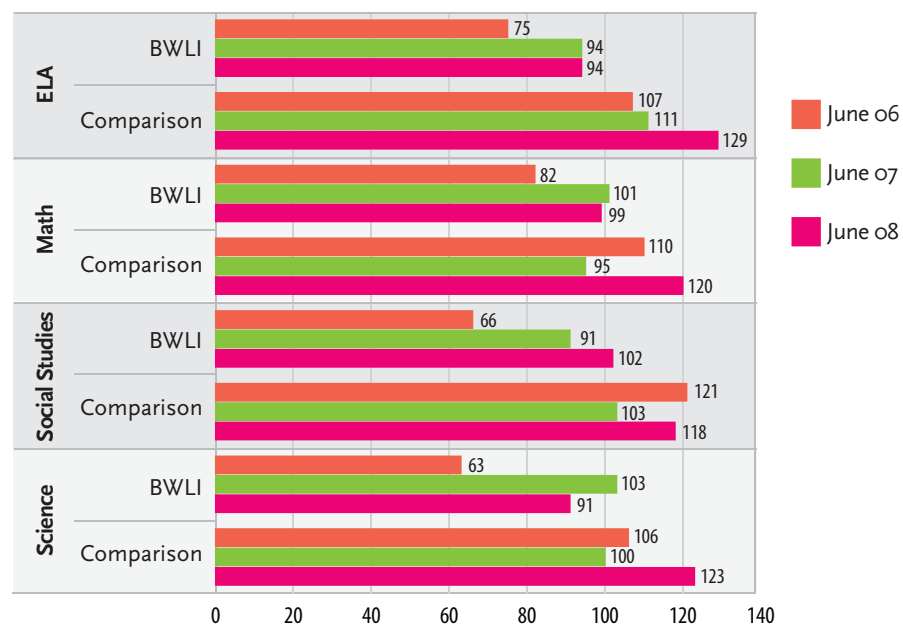


Figure S8 shows 7th grade teachers' use of technology in Reading/ELA, Social Studies, Math, and Science classes compared from the January 2006 survey (before 7th grade students had been assigned laptops) to the June 2007 survey (after the BWLI 7th grade students had 1:1 laptop access for the school year) and June 2008 (the second year of 7th grade 1:1 computing). It should be noted again that all BWLI teachers were provided their own laptops early in the 2005–2006 school year so that all survey administrations represent learning settings where teachers in the BWLI schools had laptop computers. Thus, Figure S8 illustrates the difference between teachers' use of technology with their students during a time period when student access to technology increased at the BWLI schools but not in the comparison schools.

Although BWLI teachers increased the frequency of technology use in every surveyed subject area between Year 1 (June 2006) and Year 2 (June 2007), the results were relatively similar between Year 2 (June 2007) and Year 3 (June 2008). The largest changes observed across BWLI teachers from Year 2 to Year 3 was a decrease in the frequency of use by Science teachers and an increase by Social Studies teachers.

However, 7th grade comparison teachers' use during the 2006–2007 school year decreased somewhat since the January 2006 averages, but increased in all subjects during the third year of data collection (June 2008). Comparing the BWLI teachers and comparison school teachers' use of technology during the final June 2008 survey, BWLI teachers used technology less on average than the comparison school teachers in each of the four primary subject areas. Looking only at the Year 3 usage (June 2008) BWLI 7th grade teachers used technology most frequently in social studies (102 times per year) and math (99 times per year).

**Figure S9: Number of days in the school year that BWLI and comparison 8<sup>th</sup> grade students reported using computers across their primary subject classes**

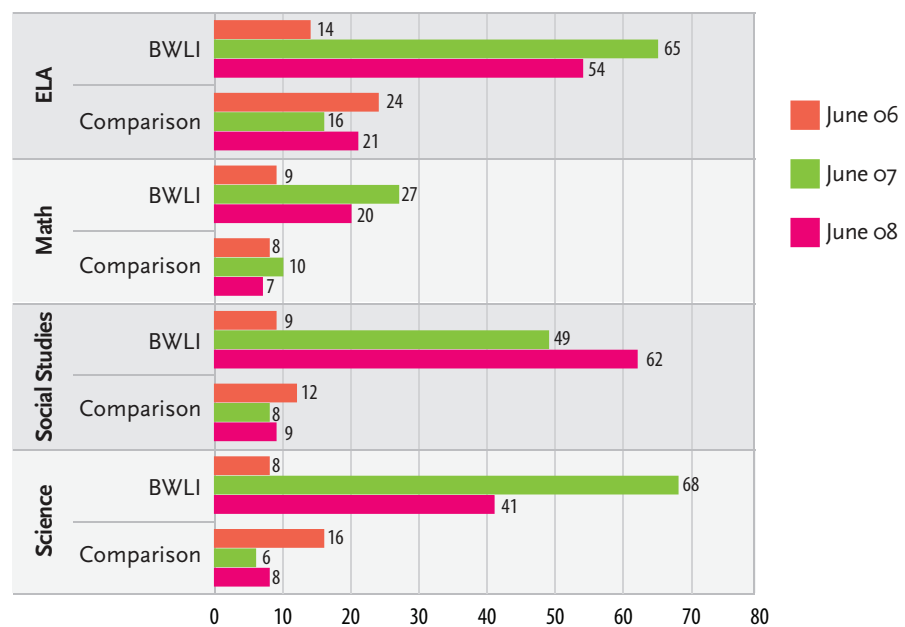


Figure S9 shows the average number of days that BWLI and comparison school 8th grade students reported using computers in their primary subject classes. Specifically, 8th grade student use of technology in Reading/ELA, Social Studies, Math, and Science classes are compared from the January 2006 survey (before 8th grade students had received laptops) to the June 2007 survey (after the BWLI 8th grade students had 1:1 laptop access for the school year) and June 2008 (the second year of 8th grade 1:1 computing).

Accordingly, the average 8th grade students' use of technology in the BWLI settings peaked across nearly all subject areas during the second year of the BWLI program, except Social Studies where student use at BWLI schools peaked during Year 3 (June 08). Despite the decrease in student use observed in Year 3 of the implementation, the use of technology at BWLI schools was still substantially greater across the comparison schools.

June 2006 results (pre-1:1 laptops), we see that the BWLI 8th grade students reported using computers about nine times per year in their Math classes, while 14 times per year in their Reading/ELA classes and approximately 8 times in Social Studies and Science. Comparison students during this same period report quite similar or greater computer use in their classes. Looking to the June 2007 8th grade survey results (post- 1:1 laptops), BWLI students reported widespread and dramatic increases in the frequency of their computer use, with the most frequent use now reported in ELA and Science classes. During this same period in the comparison schools, such substantial increases were not observed. In the June 2008 survey (Year 3), BWLI students report using computers most frequently in social studies classes where use continued to increase, while math, science and ELA classes witnessed decreases in Year 3 use. Like the 7th grade results, comparison schools results from the Year 2 (June 2007) to Year 3 (June 2008) surveys changed relatively little. Figure S10 completes the exploration of student and teacher technology use across the curriculum over the course of the BWLI implementation showing the average number of days that BWLI and comparison 8th grade teachers were reported to use their computers across their primary subject classes in all three school years.

**Figure S10: Number of days in the school year that BWLI and comparison students reported that their 8<sup>th</sup> grade teachers used computers in their primary subject classes**

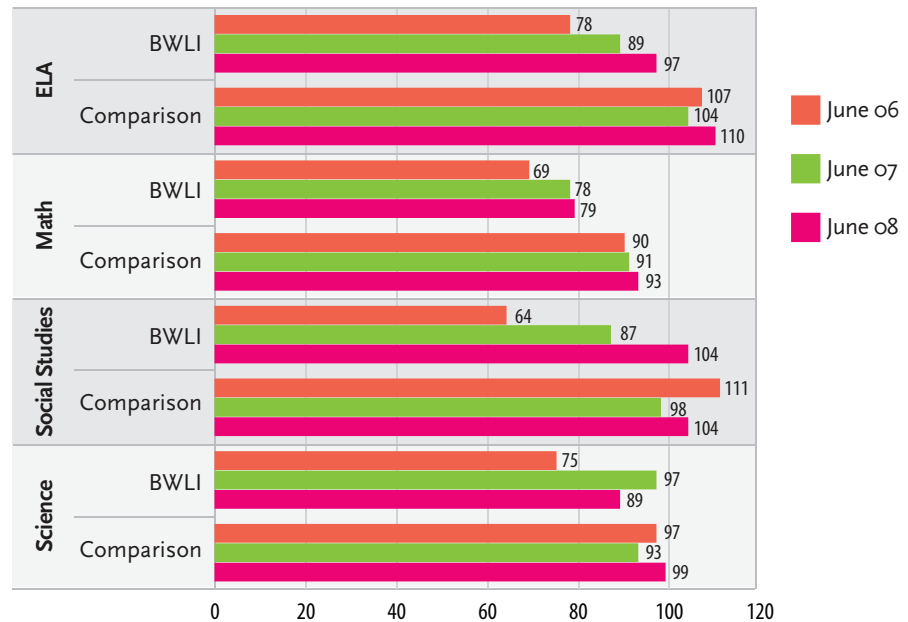


Figure S10 shows the average number of days that 8th grade teachers were reported to use technology across four primary subject areas. Specifically, grade 8 teachers' use of technology in Reading/ELA, Social Studies, Math, and Science classes are compared from the June 2006 survey (before 8th grade students had been assigned laptops) to the June 2007 survey (after the BWLI 8th grade students had 1:1 laptop access for the school year) and the June 2008 survey (the second year of 8th grade 1:1 computing). Again, it should be noted again that all BWLI teachers were provided their own laptops early in the 2005–2006 school year so that all survey administrations represent learning settings where teachers in the BWLI schools had laptop computers. As such, Figure S10 illustrates the difference between teachers' use of technology with their students during a time period when student access to technology increased at the BWLI schools but not in the comparison schools.

Although BWLI teachers increased the frequency of technology use in every surveyed subject area between Year 1 (June 2006) and Year 2 (June 2007), the results were more similar between Year 2 (June 2007) and Year 3 (June 2008). Despite the BWLI teachers increasing frequency of technology use across subject areas, the differences in 8th grade teachers' use of technology were again less robust than their student results were over time. For example, results from the June 2006 survey show that comparison school teachers were using technology with greater frequency than BWLI teachers in all surveyed subject areas. Looking at the June 2007 survey results (after grade 8 BWLI students were provided laptops), we observe increases in BWLI teachers' frequency of technology use across all subjects. However, when examining the Year 3 teacher data (June 2008), the BWLI 8th grade teachers were reported to be using technology slightly less frequently than the comparison group teachers.

**Figure S11: Frequency of BWLI and comparison students' various computer uses during the 2007–2008 school year**

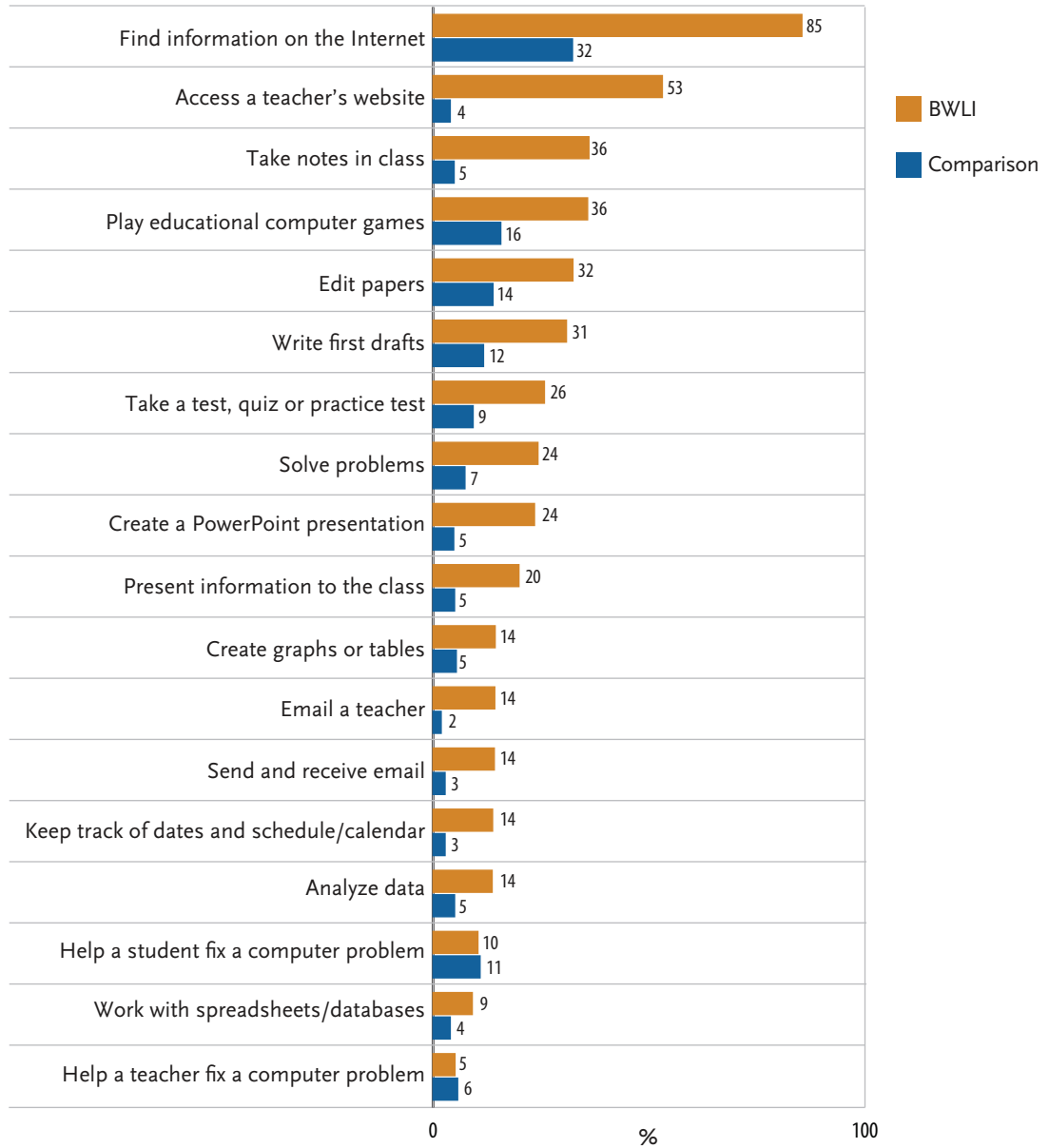


Figure S11 shows the number of times during the third year of the BWLI implementation (2007–2008 school year) that BWLI and comparison school students reported a variety of specific technology uses. Summarizing across grade levels, this table represents thousands of students' survey responses to provide an estimate of the frequency of these specific types of technology across the five BWLI schools and the two comparison schools. As Figure S11 shows, BWLI students used technology across a wide variety of applications and with substantially greater frequency than students in the comparison schools. In fact all differences are statistically significant at  $p < .0005$ , except "Help a student fix a computer problem" ( $p = .546$ ) and "Help a teacher fix a computer problem" ( $p = .648$ ).

The table also allows for the comparison of the most-frequently occurring technology uses (found at the top of the table) to the least frequently occurring uses (found at the bottom of the table). By far, the most frequently reported technology use at both BWLI and comparison schools was using a computer “to find information on the Internet”. Other frequent uses of technology in the 1:1 settings included using a computer to: “access a teacher’s web site”, “play computer games”, “take notes in class” and “edit papers using a computer”. Some of the least frequent in-school technology uses during the 2007–2008 school year included using a computer to “analyze data”, and “work with spreadsheets/databases”.

### ***Students’ Home Access to Technology***

In addition to surveying students’ use of technology in school, the student survey also measured students’ access and use of computers at their home during the academic year. In the following tables, BWLI and comparison students’ access to a home computer is examined across each of the BWLI and comparison schools using the third and final year (June 2008) of student survey results. To begin this exploration of computer use outside of school, Table S17 shows the average estimated number of home computers across BWLI and comparison students.

**Table S17: Average number of home computers across BWLI and comparison schools during the 2007–2008 school year**

	Conte	Herberg	Reid	St. Mark	St. Joe	North	South
<b>How many computers (including a school laptop) do you have at home?</b>							
0	7%	5%	6%	2%	0%	6%	5%
1	21%	22%	23%	23%	24%	23%	21%
2	30%	31%	35%	27%	44%	30%	34%
3 or more	42%	42%	37%	48%	32%	42%	40%

Although there are small differences across each of the BWLI and comparison schools, students overwhelmingly reported that they had one or more computers accessible to them at their home. Across all student survey respondents, only 5% of all survey respondents reported that they had no access to a computer at home. Interestingly, looking at a statewide survey data collected by the Massachusetts Department of Education similarly revealed that the 95% of the state’s 70,000 8th grade public school students reported having at least one home computer in a Spring 2007 Questionnaire (2007 State Questionnaire Summary; Grade 8 Results Excel Report). In other words, the sample of students from the BWLI and comparison schools looks highly similar to the state average in terms of home access to computers.

Across all of the schools, the percent of students who reported no access to a computer at home ranged from 0% at St. Joseph to 7% at Conte. Despite the relative similarity in the BWLI and comparison school results, the results summarized in Table S17 requested that students include in their

home computer estimate any school-issued computer if they were being taken home regularly. Thus, all BWLI students had a theoretical chance of taking home a school laptop that was rarely, if at all, afforded to the comparison school students. A more detailed examination of the percent of BWLI students who took school laptops home with them is presented below in Table S18.

**Table S18: Percent of students who reported taking a school laptop home with them during the 2007–2008 school year**

	Conte	Herberg	Reid	St. Mark	St. Joe	Total Comparison	Total BWLI
Every Day	31%	31%	28%	23%	20%	28%	29%
Once a Week	3%	2%	2%	4%	0%	2%	2%
Once a Month	2%	1%	1%	0%	4%	2%	1%
Every Couple of Months	2%	2%	2%	2%	0%	2%	2%
Never	62%	64%	68%	71%	76%	67%	65%

Table S18 illustrates the percent of students who reported taking a school laptop home with them during the third and final year of the BWLI implementation (2007-2008 school year). In this survey question, students were simply asked to select from five response options on “How often do you take a school computer home with you?” In addition to reporting how regularly students took a school laptop home with them during the third year of the BWLI implementation at each school, the table above also allows a summary of the cumulative take home rates across the BWLI and comparison schools. Overall, 67% of comparison school students reported that they “never” took home a school computer while 65% of all BWLI students reported that they “never” took a school computer home despite their participation in the 1:1 laptop program at their schools. In addition to a major decrease in past take home rates, students across the BWLI schools reported remarkably little variation in the percent of laptop take home rates. Table S19, below, continues the exploration of student access to technology during the 2007–2008 school year by examining students’ ease of access to a computer at their home.

**Table S19: Students ease of access to a home computer during the 2007–2008 school year**

	Conte	Herberg	Reid	St. Mark	St. Joseph	North	South
<b>When you are at home, how difficult is it for you to use a computer when you want to?</b>							
Often Difficult	4%	6%	6%	10%	4%	5%	5%
Sometimes Difficult	28%	25%	27%	24%	36%	25%	28%
Never Difficult	67%	68%	67%	66%	60%	70%	67%

Table S19 shows a summary of student responses<sup>1</sup> to a June 2008 survey item asking “When you are at home, how difficult is it for you to use a computer when you want to”. Averages across the BWLI and comparison group schools provide an estimate of students’ ease of access to a computer at their home. Across all of the schools, students at the North School reported the least amount of difficulty with 70% of responding students reporting that they “never” have difficulty accessing a computer at home. However, despite some small differences across the schools, BWLI and comparison school students overwhelmingly report that they experience relatively little difficulty in accessing a computer when they are at home. Despite efforts to have students take BWLI laptops home with them during the 2007–2008 school year, the survey results from the end of final year of implementation show that comparison school students generally had the same degree of access to technology at home. Lastly, in Table S20, below, is the percent of students’ access to the Internet from their home computer during the 2007–2008 school year.

**Table S20: Percent of students’ access to the Internet from their home computer during the 2007–2008 school year**

	Conte	Herberg	Reid	St. Mark	St. Joseph	North	South
<b>What type of internet connection do you have at home?</b>							
No home Internet	4%	4%	6%	3%	0%	5%	5%
Modem	13%	11%	11%	4%	4%	12%	11%
DSL or high speed	48%	54%	53%	62%	72%	52%	51%
Not sure	35%	42%	31%	32%	24%	31%	33%

Table S20 shows the average percent of students’ home access to the Internet across each of the BWLI and comparison schools during the 2007–2008 school year. Overall, students in all of the schools overwhelmingly reported that they had an Internet connection on their home computer. In addition, the majority of students at each school reported their home computer was connected to the Internet with high speed/DSL connection (particularly at the parochial schools) while fewer than 12% of students reported having a modem connection.

From Tables S17–S20 it is clear that BWLI and comparison school students had relatively similar access to technology at their homes, despite the fact that BWLI students were provided more opportunities to bring school technology home. Specifically, the vast majority (about 95%) of students reported having at least one computer accessible at home which was likely connected to a high-speed Internet connection. In addition to the degree to which students could access a home computer, students were also asked to reflect on typical amount of time they use a computer while at home. The following section briefly summarizes students' use of technology at home during the 2007–2008 school year.

### ***Students' Home Use of Technology***

The tables below summarize students' frequency and use of computers at home during the 2007–2008 school year. This summary begins with the average number of minutes that students estimated they spent using their home computer on a typical school day and a typical non-school day (weekend, vacation, etc.). Table S21, below, presents these summarized results across each of the BWLI and comparison schools.

**Table S21: Average number of minutes students reported using their home computer on a typical day during the 2007–2008 school year**

	<b>On a typical <i>school day</i> how many minutes would you say that you spend using a computer at home?</b>	<b>On a typical <i>day when you don't have school</i> (weekend, vacation, etc.) how many minutes would you say that you spend using a computer at home?</b>
<b>Conte</b>	60	73
<b>Herberg</b>	57	68
<b>Reid</b>	59	70
<b>St. Mark</b>	54	61
<b>St. Joseph</b>	53	66
<b>North</b>	60	70
<b>South</b>	61	71

Table S21 shows the average number of minutes that students reported they used their home computers during the 2007–2008 school year. Specifically, Table S21 shows the average number of minutes that students across the BWLI and comparison schools used computers on a typical school day and on a typical non-school day. The students who reported having at least one computer at home (95% of all June 2008 survey respondents) averaged about one hour per day using it. Individual responses of students varied: many reported five or more hours of use per day while other students reported substantially less frequent use. For example, additional analyses showed that older students in both BWLI and non-laptop settings typically used their home computer more frequently

then the younger students reported. Thus, the frequency of home computer use increased as grade level increased. In addition, students across all schools reported that they generally used their home computers more frequently on days when they don't have school than on typical school days. A more detailed investigation of home computer use is reported in Table S22, which shows the average number of minutes that students estimated they spend using their home computers for a wide variety of tasks.

**Table S22: Average number of minutes students reported using their home computer on a typical day for a variety of uses during the 2007–2008 school year**

	Conte	Herberg	Reid	St. Mark	St. Joe	North	South
<b>How many minutes would you say that you use a computer at home to:</b>							
Chat/IM	48	45	46	36	65	51	48
Search the Internet for fun	38	36	34	34	41	40	34
Use a social networking website	38	34	37	27	42	40	37
Play games	32	29	30	33	17	31	29
Download music or video from the web	26	25	26	32	39	27	26
Work on school projects	28	26	27	24	36	28	26
Write papers for school	27	26	26	25	26	28	26
Use email	23	20	22	22	26	26	22
Search the Internet for school	22	18	21	17	25	22	20
Create your own music or video projects	14	12	13	13	18	13	14
Create or maintain a website	12	12	12	11	6	11	15
Shop online	9	9	9	10	13	10	10
Use video or teleconferencing (Skype)	7	5	8	7	10	7	7

Table S22 displays the average number of minutes that students reported using their home computer for a variety of uses during the final survey (June 2008). Overall, we can see from Table S22 that students across each of the schools used their home computer for a wide variety of purposes during the third year of the BWLI implementation. Across all of the schools students reported the most time was spent using a home computer to “chat/instant message” with school averages reported between 65 and 36 minutes on a typical day. Students also reported frequent use of their home computer to “search the Internet for fun”, “use a social networking website”, and “play games”. In past surveys (June 2007) students at the BWLI schools generally reported more time devoted to academic tasks on their home computer than students across the two comparison schools. Specifi-

cally, students in the BWLI settings reported somewhat more frequent use of their home computer to “write papers for school” and “search the Internet for school”. However, in the June 2008 survey results, the difference across 1:1 and comparison school shrank between the time devoted to school-related computer use at home. Looking cumulatively across all the measured home technology uses, it is clear that many students are multi-tasking with their home computer time performing various tasks simultaneously, such as downloading an mp3 while chatting with friends and searching the Internet for fun or school.

Given the widespread reported use of home computers by students to chat and instant message, the June 2007 and June 2008 student surveys additionally included a short section on students’ experience and behaviors while chatting and instant messaging. The analyses of these results are being used to create a measurement scale for future research that serves to categorize and document student experience with this newly emerging social use of their home computer (Sandstrom, Bartini, and Bebell; 1998).

## Endnote

- 1 It should be noted that the summary statistics presented in Tables S17–S20 only represent those students who reported access to at least one computer at home. The five percent of survey respondents who reported that they did not have a home computer were not presented any additional survey items regarding home computer access and use.