

**Texas TIP Overview Document**

**Executive Summary**

The Technology Immersion Pilot (TIP) sets forth a vision for technology immersion in Texas public schools. Technology immersion encompasses multiple components, including a laptop computer for every student and teacher, wireless access throughout the campus, online curricular and assessment resources, professional development and ongoing pedagogical support for curricular integration, and technical support to maintain an immersed campus. The Texas Education Agency (TEA) originally directed more than $14.5 million in federal Title II, Part D monies toward funding a wireless learning environment for high-need middle schools through a competitive grant process. A concurrent research project funded by a federal Evaluating State Educational Technology Programs grant is evaluating whether student achievement improves over time as a result of exposure to technology immersion. The Texas Center for Educational Research (TCER)—a non-profit research organization in Austin—is the TEA’s research partner in this five-year endeavor.

**Purpose of the Study**

The overarching purpose of the study is to scientifically investigate the effectiveness of technology immersion in increasing middle school students’ achievement in core academic subjects as measured by the Texas Assessment of Knowledge and Skills (TAKS). The evaluation also examines the relationships that exist among technology immersion, mediating variables (school, teacher, and student), and student achievement. Research questions are as follows.

• How is technology immersion implemented, and what factors are associated with higher implementation levels?

• What is the effect of technology immersion on teachers and teaching?

• What is the effect of technology immersion on students and learning? and

• Does technology immersion affect student achievement?

The Theoretical Framework for Technology Immersion guides the evaluation. The experimental research design allows an estimation of the effects of technology immersion, which is the difference between the treatment and control groups. The framework postulates a linear sequence of causal relationships. Experimental schools are to be “immersed” in technology. An improved school environment for technology presumably leads teachers to create technology immersed classrooms. In turn, improved school and classroom conditions theoretically contribute to improved student learning and achievement.

**Technology Immersion**

As a way to ensure consistent interpretation of technology immersion and comparability across sites, the TEA issued a Request for Qualifications (RFQ) that allowed commercial vendors to apply to become providers of technology immersion packages. Vendors had to include six components in their plan: (a) a wireless mobile computing device for each educator and student on an immersed campus; (b) productivity, communication, and presentation software for use as learning tools; (c) online instructional resources that support the state curriculum in English language arts, mathematics, science, and social studies; (d) online assessment tools to diagnose students’ strengths and weaknesses or to assess their progress in mastery of the core curriculum; (e) professional development for teachers to help them integrate technology; and (f) initial and ongoing technical support. Based on an expert-review process, the TEA selected three lead vendors as providers of technology immersion packages (Dell Computer Inc., Apple Computer Inc., and Region 1 Education Service Center [ESC]). Six middle schools selected the Apple package, 15 selected the Dell package, and 1 school selected the Region 1 ESC package (Dell computer).

**Methodology**

**Research Design**

The research design is quasi-experimental. In the first year (2004-05 school year), the study included 22 experimental and 22 control schools. Interested districts and associated middle schools responded to a Request for Application (RFA) offered by the TEA in spring 2004 to become technology immersion schools. Applicants had to meet eligibility requirements for Title II, Part D funds (i.e., high-need due to children from families with incomes below the poverty line, schools identified for improvement, or schools with substantial need for technology). Technology immersion schools were matched by researchers with control schools on key characteristics, including eligibility for Title II funds, size, regional location, demographics, and student achievement. In the project’s second year, two middle schools in one district (one experimental and one control) were lost due to damage caused by Hurricane Rita on the Texas Gulf coast. Thus, second-year results (2005-06 school year) are for 21 treatment and 21 control schools. A re-analysis of baseline data revealed no statistically significant differences between the comparison groups.

**Setting and Participants**

The study includes grades 6-8 middle schools drawn from rural, suburban, and urban locations in Texas. Middle schools are typically small (402 students, on average), but enrollments vary widely (from 83 to 1,447 students). In the second project year, 1,257 teachers participated (604 at immersion and 653 at control campuses). The study focused on two student cohorts. Cohort 1 included 5,538 seventh graders (2,627 immersion, 2,911 control) who completed their second project year; Cohort 2 included 5,507 sixth graders (2,685 immersion, 2,822 control) who finished their first year. Nearly three-quarters of students are economically disadvantaged (about 75%) and represent minority groups (roughly 70% Hispanic and 7% African American).

**Data collection and Analysis**

Data collection involved a mix of qualitative and quantitative data sources. Researchers conducted site visits involving interviews, focus groups, and classroom observations at each of the middle schools in fall 2004 and spring of 2005 and 2006. Additional measures included annual online teacher surveys and student paper-and-pencil surveys. We also gathered school and student demographic, attendance, and achievement data from the Texas Public Education Information Management System (PEIMS) and Academic Excellence Indicator System (AEIS), and data on student disciplinary actions from schools. Researchers used either two- or three-level hierarchical linear models (HLM) to estimate the effects of immersion on teacher and student mediating variables and student TAKS achievement in reading, writing, and mathematics.

**Study Limitations**

Generalization of findings to a broader population is a primary study limitation. Compared to Texas middle-school students as a whole, students in the sample schools are substantially more Hispanic and less White and African American. Middle schools are also smaller than the statewide average. Additionally, the study relies on self-reported data from students and teachers for many outcome variables. Nonetheless, the triangulation of evidence from multiple sources (surveys, classroom observations, state demographic and test databases, student cohorts) verifies the robustness of findings.

**Results**

The evaluation of technology immersion is a four-year longitudinal study. Schools began planning and initial implementation during the 2004-05 school year; year two (2005-06) was the first full year of implementation. Implementation will continue through the 2007-08 school year. Our first-year report—Evaluation of the Texas Technology Immersion Pilot: First-Year Results (Shapley et al., 2006)—revealed positive effects of technology immersion on schools, teachers, and students.

Findings for the second year relative to these same variables are generally consistent with first-year results. Steadfast outcomes across two evaluation years and two student cohorts show that immersing a middle school in technology produces schools with stronger administrative leadership for technology, greater teacher collaboration and collective support for technology innovation, and stronger parent and community support for technology. Additionally, teachers in immersion schools are more technically proficient and use technology more often for their own professional productivity, their students use technology more often in core-subject classrooms, and teachers adopt more integration-oriented and learner-centered ideologies. Students in immersion schools are more technically proficient, use technology more often for learning, interact more often with their peers in small-group activities, and have fewer disciplinary problems than control-group students.

Also consistent with first-year results, we found no significant effect of technology immersion in the second year on student self-directed learning, and we found a significantly negative immersion effect on student attendance. Moreover, the availability of technology across two years provided no significant increase in the intellectual challenge of immersion teachers’ core-subject lessons.

First-year findings on academic achievement revealed no statistically significant immersion effects on TAKS reading or mathematics scores for Cohort 1, sixth graders. Similarly, second-year results for Cohort 1 students (as seventh graders) showed no significant effects of immersion on TAKS reading, mathematics, or writing achievement. Likewise, achievement results for Cohort 2 students (sixth graders involved in the project for one year) revealed no significant effect of immersion on TAKS reading achievement. However, for TAKS mathematics, students in immersion schools who began the year with higher math pretest scores had significantly higher mathematics achievement than their control-group counterparts. The math achievement gap favoring immersion students over control widened as students’ pretest scores increased. Although TAKS score differences between immersion and control schools usually did not differ by statistically significant margins, second-year achievement trends, in contrast to first-year results, generally favored technology immersion schools.

Findings for the first two years provide preliminary outcomes. In designing the study, we thought that some effects might emerge during early implementation, but we also believed that changes in longer term outcomes, such as student achievement, might require at least three years to surface (i.e., time for Cohort 1 students to progress from sixth to eighth grade). Additionally, there are other outcomes for immersion students that may contribute to their long-term success. Certainly, technology immersion has narrowed the technology equity gap for economically disadvantaged students. Many students who previously had no technology in their homes are becoming computer literate through their experiences with laptops. Administrators, teachers, and students alike believe that middle school students at immersion schools are better prepared for future educational and workforce requirements and for 21st Century expectations, such as communication skills, and information and media literacy.

**Research Design**

The research design is quasi-experimental. Twenty-two technology immersion schools, selected through a competitive grant process, were matched by researchers with 22 control schools on key characteristics, including size, regional location, demographics, and student achievement. Selection of control schools involved the generation of a pool of grades 6-8 middle schools eligible to receive federal Title II, Part D funds. Next, researchers used statistical procedures to identify schools that matched treatment campuses as nearly as possible on factors, including (a) district and campus size, (b) regional location, (c) the proportion of economically disadvantaged and minority students, (d) percentage of students passing all TAKS tests, and (e) the gaps between the percentage of White students and African American and Hispanic students passing TAKS (all tests). Researchers selected control schools from a list of “best matches” for each treatment school. All of the selected control schools agreed to participate, except for one. The first alternate was selected for the school that declined participation.

Given the limitations of the quasi-experimental design, we analyzed extensive baseline data to establish the comparability of treatment and control groups. In the project’s second year, however, two middle schools in one district (one immersion and one control) were excluded from analyses due to damage caused by Hurricane Rita on the Texas Gulf coast. Thus, second-year results are for 21 treatment and 21 control schools. A re-analysis of baseline data revealed that differences between group characteristics remained statistically insignificant. Thus, the integrity of the research design appears sound. Since immersion schools have somewhat larger proportions of economically disadvantaged and limited English proficient students, we used statistical methods to adjust for differences that arise from sampling variability. Generalization of findings to a broader population is a primary study limitation. Compared to Texas middle-school students as a whole, students in the sample schools are substantially more Hispanic and less White and African American. Middle schools are also smaller than the statewide average (402 students versus 667).

**Setting and Participants**

The study includes grades 6-8 middle schools drawn from rural, suburban, and urban locations in Texas. Middle schools are typically small, with about three-quarters of schools enrolling 600 students or less, and are located in either small or very small public school districts (enrolling 2,999 students or less) or large districts (enrolling 10,000 students or more). In the second project year, 1,257 teachers participated in the study (604 at treatment schools and 653 at control). Teachers are remarkably similar in terms of gender, ethnicity, advanced degrees, and average teaching experience.

The second-year study centers on two student cohorts. Cohorts 1 (sixth graders in 2004-05 and seventh graders in 2005-06) included a total of 5,538 students, with 2,627 treatment-group and 2,911 control-group students. Cohort 2 (sixth graders in 2005-06) included a total of 5,507 students, with 2,685 treatment-group and 2,822 control-group students. Comparison groups have nearly equal proportions of economically disadvantaged students (73-76%), minority students (6-8% African American and 67-73% Hispanic), and male and female students (about 50% each). The main difference between groups is the greater proportion of limited English proficient students in treatment schools (23%, 30%) compared to control schools (16%, 19%).

**Data Collection**

Data collection involved a mix of qualitative and quantitative data sources. Researchers conducted site visits at each of the middle schools in fall 2004 and spring of 2005 and 2006. Data gathered during site visits included an in-depth examination of campus conditions, school and classroom activities, and educational roles and processes through interviews with key administrators and technology leaders, focus groups with teachers and students, and observations in core-subject classrooms (English/language arts, mathematics, social studies, and science).

Additional measures included annual online teacher surveys and student paper-and-pencil surveys. The Teacher Questionnaire includes measures of school technology (Leadership, Technical Support, Innovative Culture, and Parent and Community Support) as well as other teacher mediating variables (Technology Proficiency, Professional Productivity, Student Classroom Activities, and Collaboration). Each teacher completed a baseline survey and then completed surveys in the spring of each project year. Measures of internal consistency (Cronbach’s alpha) ranged from 0.66 to 0.99. Response rates ranged from 87% to 98% across time periods. Classroom observations in sixth- and seventh-grade classrooms documented student and teacher activities, including technology use, as well as the intellectual challenge of classroom work.

Students completed a Technology Survey as sixth graders in fall and then completed the survey again every spring. The survey measured Technology Proficiency, School Satisfaction, Classroom Activities, Technical Problems, and Small-Group Work. Cronbach’s alpha reliability coefficients for scale scores ranged from 0.77 to 0.94; response rates ranged from 80% to 90% across time periods. Students also completed the Style of Learning Inventory (SLI), a measure of self-directed learning. The SLI has a reliability coefficient of 0.89; response rates ranged from 77% to 82%. Students completed the Texas Assessment of Knowledge and Skills (TAKS) in the spring of each year. Students had baseline and annual measures for TAKS Reading and Mathematics. Seventh graders completed TAKS Writing. Since TAKS scale scores are not equated across grade levels, researchers generated standard scores (T scores) for analyses. We also collected students’ school attendance rates from the TEA, and students’ Disciplinary Action Reports from each campus.

**Data Analysis**

Researchers used hierarchical linear modeling (HLM) to estimate the effects of immersion on teacher and student mediating variables and student academic achievement (TAKS scores). For teachers and Cohort 1 students, we used three-level HLM growth models to examine the effects of technology immersion on individual growth rates for various measures. Level 1 is a repeated-measures model (i.e., survey time within teachers, survey or assessment time within students), Level 2 is the between-subjects model, and Level 3 is the school level. Analyses contrasted the growth trajectories for teachers and students at immersion and control schools. We analyzed the effects of immersion on Cohort 2 students’ scores using two-level HLM models. Level 1 is the student-level model and Level 2 is the school-level model. For two-level HLM models, we calculated effect sizes (ES) in standard deviation units (usually Cohen’s d).

**Major Second-Year (2005-06) Findings**

**Effects of Immersion on Teachers and Teaching**

Immersion teachers grew in technology proficiency and in their use of technology for professional productivity at significantly faster rates than control teachers. In a self-assessment of their technology proficiency across three time points, immersion teachers considered themselves to be increasingly more technology literate than control teachers in areas involving technology operations and pedagogical skills. Similarly, teachers in immersion schools used technology significantly more often for administrative and classroom management purposes.

Teachers in immersion schools expressed stronger ideological associations across time with technology integration and learner-centered practices. Immersion teachers changed their instructional beliefs at a significantly more positive rate than control teachers. Immersion teachers increasingly employed technology integration actions, such as promoting students’ authentic problem solving or critical thinking through technology. They also expressed increasingly stronger affiliations with constructivist or learner-centered practices, such as having students establish individual learning goals, emphasizing experiential learning, and providing real-world experiences.

Teachers at schools with higher concentrations of student poverty grew in technology proficiency and adopted new ideologies at slower rates. Teachers who taught at schools with higher student poverty levels grew in technology proficiency and embraced technology integration and learner-centered practices at slower rates than their peers in more advantaged schools. Weaker supports for implementation at more impoverished immersion schools as well as the characteristics of teachers employed in those schools (proportionately more male teachers who were less likely than females to embrace innovative methods) may at least partially explain immersion teachers’ progress.

Given greater abundance of technology, teachers in immersion schools collaborated more often with their peers on technology-related issues than control teachers, and students used technology more often in immersion classrooms. Teachers at immersion schools compared to control had a significantly steeper growth rate for collaborative interactions with colleagues that supported improvements in instructional practices (e.g., developing lesson plans, exchanging information about students), as well as for the frequency of their students’ classroom activities involving technology. Despite their positive growth trend, statistics indicated that by spring 2006 teachers in immersion classrooms had students use various technology resources infrequently (i.e., about once or twice a month). While the overall level of classroom technology use was low, practices varied across teachers and core-subject areas.

Availability of technology resources had little, if any, effect on the intellectual challenge of immersion teachers’ lessons. Technology immersion’s theorized impact on student achievement hinges on technology’s facilitation of more rigorous and authentic learning experiences. Observations of core-subject teachers in fall 2004 and spring of 2005 and 2006 revealed no statistically significant differences between the intellectual demand of immersion and control teachers’ lessons. Across classrooms, lessons generally failed to intellectually challenge students. Observed activities most often focused on student acquisition of facts, definitions, and algorithms, and less often centered on writing lesson-related communication, constructing knowledge (e.g., synthesizing, explaining), or engaging in disciplined inquiry (e.g., investigation, experimental inquiry).

Effects of Immersion on Students and Learning

Technology immersion significantly increased students’ technology proficiency and narrowed the gap between economically advantaged and disadvantaged students. Estimated yearly growth in proficiency for economically advantaged and disadvantaged immersion students in Cohort 1 were nearly twice the rates for their control-group counterparts. Consequently, by the end of seventh grade, economically disadvantaged students in immersion schools surpassed advantaged control students in proficiency. Similarly, for Cohort 2, sixth graders, immersion had a significantly positive effect on students’ technology proficiency (ES = 0.30).

Students in immersion schools used technology significantly more often in core-subject classrooms and interacted more frequently with their peers in small groups. Cohort 1 students at immersion schools had a significantly steeper growth trend for the frequency of classroom activities with technology than control students. Results for Cohort 2 students, similarly, revealed significant and practically important differences in classroom activities favoring immersion schools (ES = 0.83). Students in immersion schools also had more frequent opportunities to learn with other students in small groups and to take a more active learning role.

Although immersion students used technology more often, classroom observations showed that they used technology in rather conventional ways. Observed students most frequently used a word processor for writing, learned and practiced skills (typically multi-choice exercises or digitized worksheets), created or made presentations (using PowerPoint or Keynote), or conducted Internet searches for information on an assigned topic. In general, changes in classroom activities and organizational structures in immersion classrooms did not necessarily alter the rigor or relevance of students’ experiences with core-subject content.

Technology immersion had no significant effect on student self-directed learning. We theorized that opportunities for independent and self-guided learning afforded through one-to-one technology would positively affect students’ personal self-direction. Findings in the second year replicated first-year results showing there was no significant immersion effect on self-directed learning. As both immersion and control students in Cohort 1 progressed from sixth to seventh grade, their responses to statements measuring self-direction revealed a significantly negative growth trend. Results for Cohort 2 students, similarly, revealed no significant immersion effect (ES = 0.03).

Outcomes for student engagement varied. Students in immersion schools had significantly fewer disciplinary actions, similar levels of school satisfaction, and significantly lower school attendance rates than control-group students. Disciplinary Action Reports for the 2005-06 school year showed that immersion students had proportionately fewer behavioral and disciplinary problems than their counterparts in control schools (ES = 0.14 and 0.16 for Cohorts 1 and 2, respectively). Conversely, surveys of students’ school satisfaction showed no significant differences between immersion and control students’ satisfaction with the kinds of work they do in classes or with the relevance of their schoolwork.

Unexpectedly, technology immersion had a significantly negative effect on school attendance. For Cohort 1 students, school attendance rates declined across years, and by the end of seventh grade, the estimated average attendance rate for economically advantaged immersion students was 95.9% compared to 96.4% for control students (rates were lower for disadvantaged students). Results for Cohort 2 students, similarly, showed statistically significant but small differences in attendance rates favoring students in control schools (ES = 0.07).

**Effects of Immersion on Academic Achievement**

Technology immersion’s ultimate goal is increasing students’ achievement in core academic subjects as measured by state assessments. For analyses reported below, students’ TAKS scale scores were standardized and then normalized as T scores with a mean of 50 and a standard deviation of 10.

Technology immersion had no statistically significant effect on Cohort 1, seventh graders’ achievement in reading, mathematics, or writing. For Cohort 1 students, we used three-level HLM growth models to estimate mean rates of change in TAKS reading and mathematics scores and a two-level HLM model to estimate the effects of immersion on TAKS writing scores.

• Reading. Controlling for student and school poverty, there was no significant effect of immersion on students’ growth rate for TAKS reading. The immersion effect was positive but not by a statistically significant margin. Economically disadvantaged students in both immersion and control schools grew in reading achievement at a significantly faster rate than their more advantaged peers. Combined with the positive immersion result, this yielded a positive boost in reading achievement for disadvantaged immersion students.

• Mathematics. After controls for student and school poverty, there was no significant effect of immersion on students’ growth rate for TAKS mathematics. The immersion effect was positive but not by a statistically significant margin. In contrast to reading, economically disadvantaged students at both immersion and control schools grew in mathematics achievement at a significantly slower rate than their more advantaged peers.

• Writing. After adjusting for Cohort 1 students’ initial TAKS writing scores (as fourth graders in 2003), student demographic characteristics, and school poverty, there was no statistically significant difference in the 2006 writing scores for students in immersion and control schools. The immersion effect was negative but not by a statistically significant margin.

Technology immersion had no statistically significant effect on Cohort 2, sixth graders’ reading achievement. However, immersion had a significantly positive effect on mathematics scores for higher achieving students. We analyzed the effects of immersion on Cohort 2 students’ TAKS reading and mathematics scores using two-level HLM models.

• Reading. Controlling for students’ prior achievement (as fifth graders in 2005), demographic characteristics, and school poverty, there was no statistically significant difference in the 2006 TAKS reading scores for students in immersion and control schools. The immersion effect on reading was positive but not by a statistically significant margin.

• Mathematics. After controls for students’ prior achievement (as fifth graders in 2005), demographic characteristics, and school poverty, there was no overall significant difference between immersion and control students’ TAKS mathematics scores. The immersion effect was positive but not by a statistically significant margin. However, there was a statistically significant immersion effect on mathematics achievement that acted through students’ pretest scores. Other factors being equal, having higher pretest scores predicted larger gaps in 2006 math scores favoring immersion students. Thus, immersion had a significantly positive effect on mathematics achievement for higher achieving sixth graders.

Second-year achievement trends generally favored technology immersion schools. Although TAKS scores for immersion and control students usually did not differ by statistically significant margins in the second year, noteworthy achievement trends emerged. In the first project year, TAKS reading and mathematics achievement trends favored control schools. Conversely, in the second year, immersion schools had more positive achievement trends than control schools across both Cohorts 1 and 2 and for both reading and mathematics subject areas. Outcomes for TAKS writing, in contrast, favored students in control schools. The analysis of writing achievement, however, differed from other subject areas in the wider span of time between the pretest (4th grade) and posttest (7th grade). The testing mode for writing could also have affected outcomes. Immersion students who regularly use word processors for writing may be at a disadvantage when completing a writing assessment in traditional paper-and-pencil format.

Second-year findings provide formative evaluation outcomes. The evaluation of technology immersion is a four-year, longitudinal study, and findings from the second year provide preliminary outcomes. In designing the study, we thought that some effects might emerge during early implementation, but we also believed that changes in longer term outcomes, such as student achievement, might require at least three years to surface (i.e., time for Cohort 1 students to progress from sixth to eighth grade). Moreover, while student achievement results as measured by TAKS scores are extremely important, there are other outcomes for immersion students that may contribute to their long-term success. Certainly, technology immersion has narrowed the technology equity gap for economically disadvantaged students. Many students who previously had no technology in their homes are becoming computer literate through their experiences with laptops. Administrators, teachers, and students alike believe that middle school students at immersion schools are better prepared for future educational and workforce requirements and for 21st Century expectations, such as communication skills, and information and media literacy. In the sections to follow, we describe how the generally low levels of implementation may have contributed to second-year results.

**Nature of Second-Year Implementation**

Most of the middle schools had difficulty in the second year implementing the prescribed components of technology immersion. Full implementation of the immersion model requires support in several ways: Leadership, Teacher Support (buy-in), Parent and Community Support, Technical Support, and Professional Development. Given adequate supports, teachers are expected to reach high levels of Classroom Immersion, and Student Access and Use of technology is expected to be robust. The Implementation Index, a composite campus z score measuring the strength of immersion components, showed that some middle schools had a stronger presence of immersion components that nearly approximated expected standards. Mean immersion standard scores (ranging from 2.48 to 3.06 on a 0 to 4.00 scale) indicated that supports for immersion generally failed to meet full implementation standards (3.50 to 4.0). Given generally low-to-moderate supports for immersion, the average levels of Classroom Immersion (2.48) and Student Access and Use (2.17) were below expectations. Major concerns included students’ inconsistent use of laptops across classrooms and subject areas, uneven provision of professional development supporting the design of effective technology-infused lessons, and variability in students’ access to laptops during the school day and at home.

The strength of professional development and other supports were associated with higher levels of classroom and student immersion. Variability in the quality of professional development provided by schools was a major obstacle to teachers’ growth in creating technology-immersed classrooms. While the immersion model requires that a quarter of grant funds be expended for professional development, the design rested largely with individual districts and campuses and their selected technology vendors (mainly Apple or Dell). Our measure of the strength of the campus professional development component was significantly correlated with teachers’ reported levels of classroom immersion. Leadership for immersion also emerged as an important factor in advancing change. Administrators appeared to influence teachers’ attitudes toward technology through their provision of supports for changed practice. Similarly, students’ access to and use of technology for learning was significantly related to their teachers’ greater involvement in professional development and the strength of other school supports for immersion.

A continuing challenge in the second year was the consistent provision of laptops for students both within and outside of school. Student laptop access varied widely both across and within schools. The average number of laptop access days reported by students ranged from 42 to 178 days, with only a few campuses achieving full access (the targeted 170 to 180 days per student). Student laptop access was limited by factors such as disciplinary infractions, technical issues, time for repairs, and in a few cases, parent resistance. Additionally, some immersion schools allowed students to have unlimited access to laptops outside of the school day, while others restricted students’ out-of-school access to a series of days or to laptop check-outs for teacher-assigned schoolwork. Overall, laptops’ potential influence on learning varied across students and schools.

Schools with a greater proportion of economically disadvantaged students had lower implementation levels. Schools with larger concentrations of student poverty had significantly lower levels of implementation. Accordingly, teachers at these schools grew in proficiency and created immersed classrooms at significantly slower rates than teachers in more advantaged schools. Schools serving predominantly disadvantaged and often low-performing student populations faced special challenges in implementing a project requiring profound school and classroom change.