Evaluation of the Texas Technology Immersion Pilot

An Analysis of Second-Year (2005-06) Implementation

Executive Summary

October 2007

Prepared for
Texas Education Agency

Prepared by
Texas Center for Educational Research

TCER
Texas Center for Educational Research

Texas Center for Educational Research
P.O. Box 679002
Austin, Texas 78767-9002
800-580-TCER (8237)
512-467-3632 512-467-3658 (fax)
www.tcer.org

TCER
Texas Center for Educational Research

Executive Summary

The Technology Immersion Pilot (TIP), a project sponsored by the Texas Education Agency (TEA), leverages federal Title II, Part D funds to support a wireless learning environment for high-need middle schools. 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 primary partner in this four-year endeavor that began in the 2004-05 school year and will continue through 2007-08.

Technology immersion encompasses multiple components, including a laptop computer for every middle school student and teacher, wireless access throughout the campus, curricular and assessment resources, professional development and ongoing pedagogical support for curricular integration, and technical support for immersion. 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 (English language arts, mathematics, science, and social studies) as measured by the Texas Assessment of Knowledge and Skills (TAKS). The study also examines relationships that exist among contextual conditions, technology immersion, intervening factors, and academic achievement. Accordingly, researchers have annually conducted site visits to treatment and control campuses in order to better understand initial conditions and changes over time.

Visits to campuses in fall 2004 and spring 2005 established the comparability of treatment and control schools and documented first-year implementation. In spring 2006, follow-up site visits to each of the 22 immersion and 22 control schools focused on second-year activities (encompassing the 2005-06 school year). Researchers conducted interviews with principals, technology coordinators, and central administrators and focus groups with a sample of sixth- and seventh-grade teachers and students. In the second year, two middle schools in one district (one immersion and one control) were excluded from analyses due to disruptions of school operations caused by Hurricane Rita on the Texas Gulf coast. Thus, second-year results are for 21 immersion and 21 control schools. Data gathered at control campuses verified that the availability and use of technology had not changed substantially since the project's inception, while data gathered at immersion schools contributed to an in-depth examination of second-year implementation.

This report combines qualitative data (from interviews and focus groups with selected subjects) and quantitative data (from surveys of all teachers and students) to provide a comprehensive description of second-year implementation of technology immersion. We measured implementation using standard-based scores defining four levels of immersion (*minimal*, *partial*, *substantial*, and *full*) and standardized implementation indices (z scores). Both types of scores produced measures for five immersion support components (Leadership, Teacher Support, Parent and Community Support, Technical Support, Professional Development) and two teacher and student immersion components (Classroom Immersion and Student Access and Use). Major findings on second-year implementation are the following.

School Implementation Levels

Most middle schools had difficulty implementing the prescribed components of technology immersion in the second year. The Implementation Index, a composite campus *z* score measuring the overall presence of the seven immersion components, showed that some middle schools had a much stronger presence of the immersion components than others. Mean immersion standard scores (ranging

from 2.48 to 3.06 on a 0 to 4 scale) showed that supports for technology immersion from school administrators, teachers, parents and community members, technical staff, and professional development providers typically fell short of full implementation standards (3.50 to 4.00). Given generally low-to-moderate supports for immersion, the levels of Classroom Immersion (2.48) and Student Access and Use (2.17) were below expectations.

Leaders at many schools reported implementation progress in the second year; however, others believed implementation reached a plateau. Some administrators thought the second year went more smoothly because their schools had established laptop management procedures, enacted acceptable-use policies, distributed laptops earlier in the year, stabilized school infrastructures, and/or increased Internet bandwidth. Moreover, leaders said teachers' increased comfort with technology permitted greater attention to classroom integration. Implementation progress was hindered at some schools by financial challenges in providing laptops for every student, parent refusals of laptops, administrator and teacher turnover, competing reform initiatives, Internet safety issues, and loss of teacher buy-in.

Teachers were more comfortable using technology in the second year and made strides toward classroom integration. Many teachers in focus groups indicated that second-year implementation progressed more smoothly. Teachers cited progress relative to increased bandwidth that accommodated classroom Internet access and revised policies that limited students' access to email, games, and music or video downloads. Also, many teachers had received sufficient training in immersion package tools and were able to use them in classrooms.

Schools with a greater proportion of economically disadvantaged students had lower implementation levels. Teachers at economically disadvantaged schools grew in proficiency and created immersed classrooms at significantly slower rates than teachers in more advantaged schools. In general, schools serving mainly disadvantaged and often low-performing student populations faced special challenges in implementing a whole-school initiative that involved profound school and classroom change. These schools needed additional time and external supports to plan for technology immersion.

Supports for Immersion

Many schools needed stronger second-year implementation supports in the areas of leadership, parental support, technical support, professional development, and teacher commitment to innovation.

Administrators at about half of schools provided strong leadership for technology immersion. Surveyed teachers at 48% of schools believed administrators provided the kind of leadership necessary for at least substantial immersion. Although no clear distinctions could be made between higher and lower implementing schools, successful leadership practices emerging from qualitative comments suggested that leadership was more effective if administrators established a clear direction for immersion and helped build the capacities of their staff. Administrator turnover weakened momentum. Some schools had new principals and superintendents who had not been involved in developing and implementing the technology immersion model, and consequently, did not provide the leadership needed for continued progress.

Parent support for immersion was an issue at some schools, but outreach from principals reduced concerns. Administrators at four schools said a small number of parents refused to give permission for their children to have laptops, with reasons for denial centering on concerns about financial responsibility and Internet safety. At two higher implementing campuses, principals assuaged parental fears by telephoning or meeting with parents to discuss their concerns, offering parent training on laptop monitoring strategies, and helping parents to understand the contribution of laptops to students' development as learners and their educational opportunities.

Even though schools expanded staffing for technical and pedagogical support in the second year, additional help was needed to address laptop repairs, Internet safety issues, and in-classroom support for teachers. Campus technology coordinators typically acted as both technical and pedagogical support providers, and several had other assignments that diffused their efforts. As a result, surveyed teachers at most campuses (81%) reported only partial levels of technical support. Likewise, technology coordinators considered technical problems as the most urgent second-year need. As campus technology infrastructure at many schools (wiring, Internet connectivity) stabilized in the second year, laptop maintenance demands and Internet safety monitoring responsibilities increased. Time devoted to technical issues left little time for coordinators to assist classroom teachers with curricular integration.

Professional development received by many teachers in the second year was insufficient to advance classroom immersion. The quality of professional development also varied widely across schools. Survey results showed that core-subject teachers at less than half of campuses received close to the prescribed number of professional development hours (about 80 hours over two years), and across all schools, teachers *rarely* (once or twice a month) or *never* received classroom coaching or mentoring. Core-subject teachers in focus groups said that the bulk of professional development took place during the first year. As a result, new teachers, in particular, had insufficient training opportunities. Professional development also shifted in the second year from whole-group sessions to more individualized training and from vendor-provided training (Dell and Apple trainers) to increased reliance on multiple professional development providers (vendors, local staff, education service center staff, conferences). Thus, the nature and quality of professional development varied across campuses.

Teachers' support for technology immersion was weakened by challenges that often outweighed benefits. While teachers at most schools reported substantial support for learning about and using new technologies, teachers at a third of schools reported only partial support. Core-subject teachers who participated in focus groups appreciated that student laptops eliminated the need to schedule time in the library or in a computer lab, allowed more varied lesson plans and individualized learning, and provided opportunities for in-depth research. On the other hand, teachers were concerned that time absorbed by laptops diminished curricular coverage and TAKS preparation. Teachers also had difficulty finding time to prepare laptop-related lessons, making arrangements for students without laptops, handling technical problems, and monitoring students' appropriate laptop use.

Classroom Immersion

Teachers' progress in creating technology-immersed classrooms was measured by elements gauging their ideological orientation (Technology Integration, Learner-Centered Instruction), Student Activities (with technology), Communication, and Professional Productivity.

Some core-subject teachers were not strongly committed to the instructional and learning practices advocated as part of the technology immersion model. Some teachers believed new technologies were not pertinent to their curriculum and instructional practices and, in some instances, technology integration and learner-centered instruction were inconsistent with teachers' ideological beliefs and values. Consequently, teachers at most schools (81%) reported that students just *sometimes* used various technology resources to support core-content learning (partial implementation). At a fifth of schools, students *rarely* or *never* used technology resources (minimal implementation).

As teachers became more comfortable with technology in the second year, many drew selectively from a wide range of technology resources to enhance their teaching and students' learning experiences. Although the frequency of students' laptop use did not meet full immersion standards, teachers' comments in focus groups revealed progress toward more diverse technology uses. English language arts and reading (ELA) teachers said students used laptops to research information about stories

read, keep journals, write original stories, and make presentations. Social studies teachers at all schools believed laptops enhanced their ability to conduct research with their students, and laptops permitted student access to more and better information through resources such as virtual tours or field trips, online newspapers, video clips, and electronic textbooks. Science teachers at many schools had students use laptops to research a wide range of topics, present their research, conduct virtual experiments, take notes, and diagram or illustrate science concepts. Mathematics teachers at all schools found it difficult to integrate laptops in their classes, primarily because they had too few math-related resources and believed pencil-and-paper activities were best for math. Teachers at many schools, however, used laptops for math extension (online activities and games) and diagnostic assessment.

Although many teachers embraced technologies that enhanced their professional productivity, few used communication tools to transform classroom management. Across schools, teachers frequently used new resources to enhance their own professional productivity (e.g., keep records, develop lessons, present content). Conversely, teachers at only a few schools used email regularly to communicate with students about class work or to contact parents. And, although teachers at many schools received web-based communication tools, such as eChalk, as part of immersion packages, few teachers used school or class websites to manage information.

Students believed teachers' tendencies to use laptops reflected the relevance of laptops to the subject area and teachers' personal traits. Some students in focus groups believed laptops were unsuitable for math because problems had to be worked out on paper and inappropriate for writing because the TAKS test requires pencil-and-paper compositions. Conversely, students believed ample learning resources and websites made laptops ideally suited for social studies and science. Students also linked teacher characteristics to laptop use, indicating that teachers who are strict, outdated, lack technology proficiency, do not find laptops useful for schoolwork, or fear that students will behave irresponsibly seldom or never used laptops. In contrast, students thought teachers who know how to use technology and believe laptops provide a different way of learning used them more often.

The strength of professional development and other supports were associated with higher levels of classroom immersion. Analyses of associations between immersion support components and classroom practices revealed that the strength of professional development at a school was significantly correlated with teachers' ideological affiliations with technology integration and learner-centered practices as well as their overall level of Classroom Immersion. In addition, teachers' perception of administrative leadership for technology was significantly associated with their commitment to innovation, views on parent/community and technical support, and the quality of professional development. Thus, school administrators appeared to influence teachers by providing supports for changed practice.

Student Access and Use

In the second year, we measured three elements of Student Access and Use: Laptop Access Days, Core-Content Learning, and Home Learning.

Students' access to laptops varied widely both across and within schools. Students at just a third of campuses had either substantial access to laptops (140 to 178 days per student) or full access (170 to 180 days per student). Thus, students at higher implementing schools had laptops available for use a greater number of days. Students' access to laptops was diminished in some cases because schools did not provide laptops for all students, and some students who received laptops had them for fewer days because of repairs (20% of students) or penalties for misuse/misbehavior (7% of students).

Even though students as a whole used laptops infrequently for learning in core subjects, students in some schools and classrooms used laptops more often. Similar to teachers' reports, students at two-thirds of schools used laptops in core classrooms *sometimes* (once or twice a month) to *often* (once or twice a week). Students at the remaining third of campuses *rarely* (a few times a year) or *never* used technology resources in core classes. Although the frequency of student technology use generally did not meet expectations, sixth and seventh graders participating in focus groups described a variety of laptop uses in their core-subject classes.

Students, similar to their teachers, described a wide range of activities with laptops in core-subject classes. In ELA classes, students used laptops most commonly to write compositions and create presentations, learn and practice skills, read and comprehend texts, use learning programs, and play educational games. In social studies classes, students used laptops most often to research an assigned topic on the Internet and generate a product such as a composition or presentation, to take notes, and to answer content-related questions. In science classes, students used laptops most often to research an assigned topic on the Internet and create a composition or presentation, to define vocabulary words, and to take notes. Students viewed science videos, visited interactive websites, and conducted scientific investigations less often. Students used laptops less often in mathematics classes and the range of activities was less diverse. Students most commonly used laptops for online math-related activities or games, or to take diagnostic tests and prepare for the TAKS math test.

Students at higher implementing campuses used laptops more often outside of school and for more academic purposes. During the second implementation year, similar to the first year, a third of schools (8 of 21) either limited their students to in-school laptop use exclusively, or they allowed laptops to go home for homework or special assignments only. Students at higher implementing schools reported using their laptops more often outside of school and for more academic purposes, such as completing research projects, making PowerPoint presentations, answering chapter questions with an electronic textbook, typing or writing stories, or defining vocabulary terms. When students at lower implementing schools used laptops outside of school, it was more likely to be for playing games, listening to music, watching DVDs, or emailing rather than for academic purposes.

Students' access to and use of technology for learning was significantly related to their teachers' involvement in professional development as well as the strength of the school's supports for immersion. The quality of campus professional development supporting immersion, teachers' support for technology innovation, parent and community support for technology, and the adequacy of technical support were significantly associated with higher levels of Student Access and Use. Similarly, students' laptop use for learning at home (i.e., for homework in core subjects or learning games) was positively associated with the school's emphasis on professional development and parent/community support. All told, supports for immersion at higher implementing schools helped ensure that students' experiences more nearly approximated the immersion goal for core-content learning within and outside of school.

Effects of Immersion on Students

Teachers, technology leaders, and sixth and seventh graders offered their views on technology immersion's effects on students.

Students preferred and believed they benefited more from laptops and electronic resources than from traditional print media. Students across campuses preferred laptops over textbooks, library books, and other forms of print media. Internet search tools and various online resources permitted access to information more quickly and efficiently and allowed students to conduct research on a greater variety of topics. Of some concern, however, were students' general dislike for reading and the potential for

obtaining information from Internet resources without reading extensive quantities of text. Thus, students needed explicit guidance from teachers to ensure that assignments required the use of appropriate reading strategies for comprehending electronic texts.

Students believed access to laptops improved their technology proficiency. Similar to survey results showing significantly positive effects of immersion on students' technology proficiency (Shapley et al., 2007), sixth and seventh graders in focus groups at most campuses said their keyboarding skills had improved over the duration of the project, and they were learning, mastering, or being exposed to a wide variety of learning resources and productivity tools such as Internet search tools, Word, PowerPoint, Excel, and Publisher. Teachers at more than half of schools, however, were frustrated by the need to devote class time to teaching sixth graders the basics of computer and program usage. Some schools implemented or planned to implement a sixth-grade orientation covering laptop basics to address the problem.

Students thought laptops positively affected their capacities as learners. Students at many campuses described ways that laptops affected their capacities as learners, including changes related to self-direction (working at their own pace, formulating questions and finding answers, seeking help from and discussing ideas with peers), organization of materials, multi-sensory experiences, creativity, and ownership of learning. In contrast to students' comments, results for the *Style of Learning Inventory* or *SLI* (a quantitative survey of self-directed learning) have shown no significant differences in the self-directed behaviors of immersion and control students (Shapley et al., 2007). The *SLI*, however, does not measure the same types of learning strategies that students described in focus groups.

Students said technology immersion increased their engagement in school and learning. Students representing all campuses said school with laptops is more "fun" than school without laptops. Students linked fun with other terms such as "important," "useful," and "helpful," thus acknowledging laptops as an important learning tool. Students also attributed improved classroom behavior to technology immersion, saying that students are quieter, pay more attention in class, and are more focused on class work. Comments about improved behavior are consistent with quantitative data showing that students in immersion schools have significantly fewer disciplinary actions than control-group students (Shapley et al., 2007).

Laptops challenged middle school students to assume greater responsibility than had previously been expected. Some students appreciated the sense of responsibility and trust extended to them through individual laptops, while others worried about potential laptop damages and associated costs. Technology coordinators at some campuses noted improved student responsibility for laptops, whereas coordinators and teachers at other campuses, particularly lower implementing schools, cited increased student carelessness and damage. Many students also complained about the responsibility of carrying heavy laptops from class to class, especially when they were not consistently used. Undoubtedly, providing individual laptops presented new challenges for students who had to demonstrate greater self-responsibility than had been expected before immersion.

Although opinions about the effects of technology immersion on academic achievement varied, most believed that immersion had prepared students for the future. Some students at almost all campuses believed access to laptops and learning resources had improved their grades. Teachers, on the other hand, thought laptops had improved student skills (e.g., vocabulary, communication, and reading) but not their academic achievement or TAKS test scores. Second-year quantitative analyses showed no significant effects of immersion on TAKS scores, although immersion schools had more positive achievement trends in reading and mathematics than control schools (Shapley et al., 2007). In contrast to opinions on grades and test scores, students and educators alike thought technology immersion had enabled students to gain valuable skills that prepared them for the future in terms of their college and career readiness.