Evaluation of the Texas Technology Immersion Pilot

Outcomes for the Third Year (2006-07)

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(school, teacher, and student), and student achievement. The research design is quasi-experimental with middle schools assigned to either treatment or control groups. This report concentrates on information gathered during the 2006-07 school year, but analyses also include data from the first (2004-05) and second (2005-06) project years. Researchers answered the following questions:

How is technology immersion implemented,

What is the effect of technology immersion on teachers and teaching,

What is the effect of technology immersion on students and learning,

Does technology immersion affect student achievement, and

What factors are associated with implementation and student outcomes?

The *Theoretical Framework for Technology Immersion* guides the evaluation. The experimental research design allows an estimate of the effects of the intervention, which is the difference between the treatment and control groups. The framework postulates a linear sequence of causal relationships. First, experimental schools are to be "immersed" in technology through the introduction of technology immersion components. An improved school environment for technology should then lead to teachers who have greater technology proficiency, use technology more often for their own professional productivity, collaborate more with their peers, have students use technology more in their classrooms, and use laptops and digital resources to increase the intellectual challenge of lessons. In turn, these improved school and classroom conditions should lead students to greater technology proficiency, more opportunities for peer collaboration, greater personal self-direction, more rigorous and authentic learning experiences, and stronger engagement in school and learning. Student mediating variables presumably contribute to increased academic performance as measured by standardized test scores. In the framework, prior student achievement and student, family, and school characteristics exert their own influence on learning.

Setting and Participants

The research includes 42 grades 6 to 8 middle schools drawn from rural, suburban, and urban locations in Texas. Schools are divided equally between the treatment group (21) and control group (21). The middle schools are typically small (402 students, on average); however, enrollments vary widely (from 83 to 1,447 students). While schools are mainly concentrated in small or very small Texas districts (less than 3,000 students), about a third of schools are in very large districts (10,000 or more students).

The study focused on three student cohorts in the third year. Cohort 1 included eighth graders (2,586 treatment, 2,863 control) who completed their third project year, Cohort 2 included seventh graders (2,644 treatment, 2,882 control) who finished their second project year, and Cohort 3 included sixth graders (2,597 treatment, 2,840 control) who concluded their first year. Students in the cohorts were predominantly minority (65%) and economically disadvantaged (67%). In the third year, a total of 1,253 teachers participated in the study, including 591 in immersion schools and 662 in control schools.

Data Collection and Analysis

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 again in spring 2005, 2006, and 2007. For this report, we concentrate on data gathered through observations in a sample of grades 6, 7, and 8 classrooms (English language arts, mathematics, social studies, and science). Additional measures include annual online teacher surveys and student paper-and-pencil surveys. We also have gathered school and student data on a yearly basis from the Texas Public Education Information Management

System (PEIMS) and the Academic Excellence Indicator System (AEIS), as well as data on student disciplinary actions from schools.

We used either two- or three-level hierarchical linear models (HLM) to analyze immersion effects on teachers' and students' perceptions of technology and proficiencies, immersion effects on students' TAKS achievement, and associations between implementation and outcomes. Three-level HLM growth modeling estimated the effects of immersion on rates of growth for dependent variables across time (2004, 2005, 2006, and 2007). When only two data points were available, we used two-level HLM models to estimate the effects of immersion on 2007 scores. For two-level HLM models, we calculated effect sizes (ES) in standard deviation units (usually Cohen's *d)*. Effect sizes greater than 0.5 are typically interpreted as large, 0.5 to 0.3 as moderate, 0.3 to 0.1 as small, and less than 0.1 as trivial.

Study Limitations

The sample selection process and matching procedures used with the quasi-experimental design appear to have produced a sample of schools with good internal validity, in that there are no large, statistically significant treatment-control group differences. However, a threat to internal validity was introduced in the third year when control schools began to plan for technology immersion and most of the control teachers received laptops, instructional resources, and more intensive professional development. Generalization of findings to a broader population (external validity) 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, and schools are located either in small or very small districts (64%) or large districts (36%), which differs from the statewide distribution of schools. Additionally, for many variables, the study relies on self-reported data from surveys of teachers and students—thus, some findings on changes in proficiencies and practices reflect respondents' perceptions. Nonetheless, the triangulation of evidence from multiple sources (surveys, classroom observations, state demographic and test databases, multiple student cohorts) verifies the robustness of findings.

group activities as they advanced to higher grade levels. In general, as immersion teachers altered their beliefs about instructional practices, they began to configure classroom activities differently.

Students at immersion schools, compared to co

Effects of Technology Immersion on Academic Achievement

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. We used two-level HLM models and three-level HLM growth models to estimate the effects of immersion on students' test scores. Texas students complete TAKS tests annually in reading and mathematics, so reported evidence is stronger for those

The effects of technology immersion on reading and mathematics achievement generally became stronger over time as teachers and students became more accomplished technology users. The immersion effects on reading and mathematics achievement evolved across three project years. In the first project year, the immersion effects on TAKS scores were negative. In the second year, immersion effects were typically positive, but not by statistically significant margins. In the third year, significantly positive immersion effects on TAKS mathematics emerged for each of three student cohorts, and links were established between higher levels of student technology use and achievement. These findings underscore the importance of longitudinal studies in assessing the impacts of educational initiatives on student academic achievement.

Evidence regarding the effects of technology immersion on students' TAKS social studies, science, and writing achievement is inconclusive. Since TAKS tests for social studies, science, and writing are not administered annually, immersion effects for these subject areas cannot be replicated across cohorts and years. Accordingly, it is not possible to draw definitive conclusions about the effects of technology immersion for these subject areas. Available results typically show no statistically significant effects of immersion, with differences between groups favoring immersion students for TAKS social studies and control students for TAKS science and writing.

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