Time To Know, Inc.

Effects of Teaching and Learning in Time To Know Environment on Mathematics and English Language Arts Learning Achievements: Evaluation Study in Dallas, TX

Executive Summary

November, 2010

Modern education calls for a conceptual change in teaching and learning. Technology-rich learning environments are becoming more prevalent in the classroom and have been used as intellectual partners for active participation in construction of knowledge (Salomon & Perkins, 2005; Weston & Bain, 2010). *Time To Know* is an environment designed to increase learning and academic engagement as well as enhance teachers' knowledge of constructivist teaching methods in mathematics and Language Arts. Utilizing a constructivist approach (e.g., Von Glasersfeld, 1995) with the guidance of the teacher (e.g., Hannafin & Land, 1997), *Time To Know* developed an interactive teaching and learning environment including one-to-one student computing with a workstation for the teacher. The Digital Teaching Platform (DTP) enables the teacher to conduct or plan a lesson, to receive formative and summative assessment reports for data-driven instruction, animated narratives, classroom management tools and student assessments (Walters, Dede & Richard, 2009; Weiss & Bordelon, 2010). The learning activities, aligned with state curriculum standards, are designed to be engaging and relevant to students, an important aspect of supporting deep understanding of difficult concepts and differential learning (e.g., Fadel & Lemke, 2006; Heacox, 2009; Savery, 2006). As an environment based on teacher guidance, the teachers are not replaced by the technology; their instructional processes are enhanced by the design and the use of technology. Every teacher who joins this new teaching process and digital environment takes part in professional learning and guidance from an instructional coach.

Rockman et al, an independent research, evaluation, and consulting firm based in San Francisco, CA developed an extensive evaluation plan to assess the overall effect of the *Time To Know* technology-based Mathematics and English Language Arts environment on teaching and learning processes and academic outcomes in fourth grade classrooms. This objective was met through identifying the changes in teacher attitudes, classroom pedagogy, student engagement, and academic achievement. The evaluation also explored the effect of implementing *Time To Know* on broader issues of school culture, teacher attitudes and practices, and student attitudes and behavior. Lastly, the evaluators provided formative feedback to *Time To Know* from teachers, school administrators, and students.

The primary research questions at the foundation of the evaluation were:

1. What is the impact of *Time To Know* environemt on **Reading, Writing and Mathematics academic achievements**, as measured by Texas Assessment of Knowledge Skills (TAKS) tests, compared to traditional settings?

2. What is the impact of *Time To Know* environment on academic achievements of **at-risk students**, compared to at-risk students in traditional settings?
3. Do *Time To Know* students demonstrate greater **Mathematics reasoning skills** than control students and do lower performing students (based on TAKS) differ from higher performing students on Mathematics reasoning skills?
4. Do *Time To Know* classes show **greater return on investment** (ROI) than control classes?
5. What is the impact of *Time To Know* environment on **teaching practices and teachers' attitudes**?

The evaluation followed a quasi-experimental design with two participating school districts, eight schools, and sixteen classrooms. Half of the classrooms served as controls, participating in the evaluation activities but not the *Time To Know* environment. Data was collected at several time points throughout the school year from students, teachers and administrators, including TAKS scores, short-term student assessments, teacher and administrator interviews and surveys, as well as informal classroom observations.

Highlighted results from the evaluation are listed below:

- *Time To Know* students in both participating districts **significantly outperformed** control students on the **Reading, Writing and Mathematics** TAKS tests (see Figures 1-3).
- The *Time To Know* environment has changed dramatically the students' distribution of academic achievement as measured by TAKS standardized tests: 90% of the students have met or exceeded the standard level in Reading, 98% in Writing and 93% in Mathematics.
- **At-risk students** participating in *Time To Know* obtained similar scores to non-at-risk students. However, the at-risk control students did significantly worse on their mathematics TAKS than non-at-risk students.
- *Time To Know* students demonstrated **greater Mathematics reasoning skills** than control students.
- **Lower performing students** did as well as higher performing students on Mathematics reasoning skills in the *Time To Know* group. This was not the case for the control students.
- In interviews and surveys, *Time To Know* teachers indicated **greater return on investment aspects of the environment**: A **positive change** in both **student attendance and behavior** as compared to the control teachers. Also, teachers showed greater **increase in teaching satisfaction** during the 2009-10 school year. Nearly all *Time To Know* teachers attributed this to the *Time To Know* environment.
- *Time To Know* teachers reported **greater confidence using technology in the classroom, greater growth in shifting to a student-centered classroom, and applied a greater range of instructional strategies** than control teachers.

Figure 1: The impact of Time To Know environment on reading standardized test achievements (Scale 117-853)

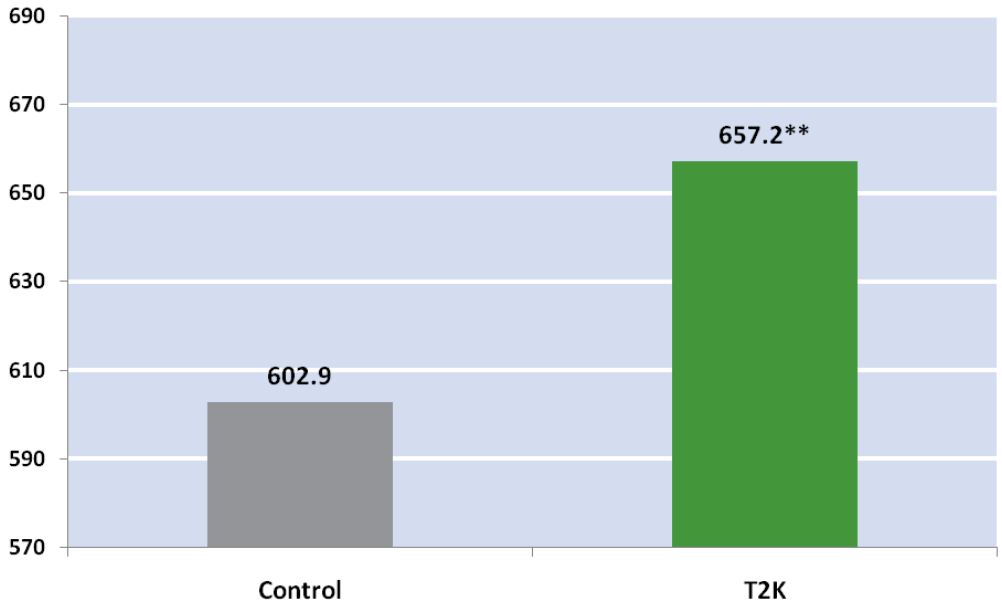

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Figure 2: The impact of Time To Know environment on writing standardized test achievements (Scale 1504-2885)

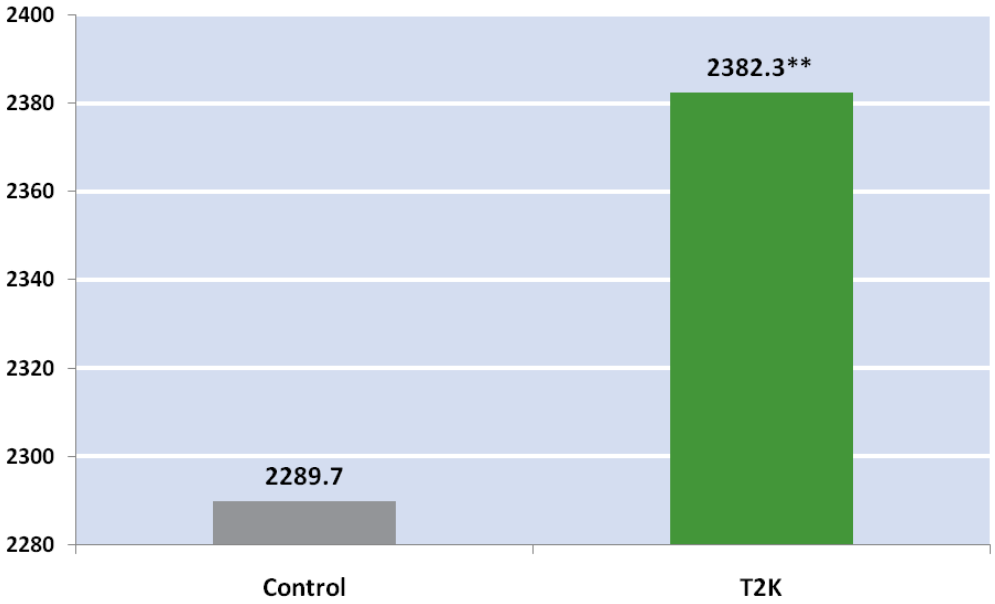

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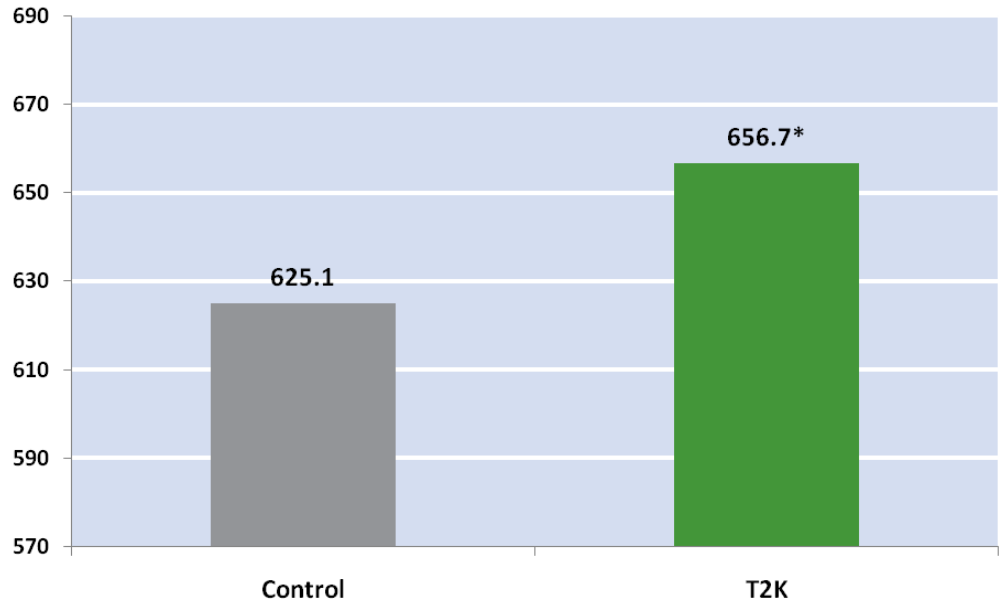
Figure 3: The impact of Time To Know environment on Mathematics standardized test achievements (Scale 169-842)



* p<.05

Over the past decade, there has been a growing interest in one-to-one laptop technology initiatives, whereby the teachers and the students have full access to a technology-rich learning environment (Bebell, 2007; Gulek, & Demirtas, 2005; Jaillet, 2004; Lei & Zhao, 2008; O'Dwyer et al., 2008; Shapley et al., 2009; Silvernail & Gritter, 2005; Weston & Bain, 2010; Zucker & Light, 2009). However, most of the programs have revealed mixed research evidence in the context of paradigmatic change in teaching and learning practices, as well as the impact on student academic achievement. Time To Know, in the first year, produced **impressive academic growth** for the treatment students in both Mathematics and English Language Arts. Moreover, these Time To Know students also showed greater Mathematics reasoning skills. Teachers provide one-on-one help to struggling or lower performing students while more advanced students work at their own pace. This **differentiated instruction**, the cornerstone of the environment, **proved highly effective**. Time To Know changes the conversation from discussions about ubiquitous computing and the use of computers to improve student performance to that of teaching and strategies for getting the most from their students. These strategies can differ from classroom to classroom, allowing teachers to use their experiences and best judgment in combination with recommendations from Time To Know. The Time To Know environment works with teachers; it does not attempt to replace them. Meaningful learning and achievement gains are more likely to emerge from innovative teaching and learning involving individualized, problem-based instruction, increased motivation, and engagement. Overall, the findings of the current study showed **empirical evidence of the effectiveness of *Time To Know's*** one-to-one computing learning environment, in which a comprehensive digital curriculum is combined with a constructivist-oriented teaching platform.

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