Abstract Title Page

Title: The Impact of the *enhancing Missouri's Instructional Networked Teaching Strategies* (eMINTS) Program on Student Achievement, 21st-Century Skills, and Academic Engagement – Second-Year Results

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Abstract Body

Background / Context:

Despite years of implementing standards-based accountability systems, many teachers today lack the necessary preparation to develop standards-based instructional strategies and to inform decisions utilizing student assessments (Drake, 2007). The eMINTS (*enhancing Missouri's Instructional Networked Teaching Strategies*) National Center at the University of Missouri (UM), in partnership with the Missouri Department of Higher Education (DHE), offers the eMINTS professional development (PD) program to teams of educators, especially those serving high-need students. eMINTS PD generates building wide reform by helping teachers master the translation of any state standards and information from assessments into engaging classroom practices that employ technology. The program is based on four underlying research-based components: *inquiry-based learning, high-quality lesson design, community of learners*, and *technology integration,* and addresses issues identified as barriers in the consistent use of standards-based instruction and technology. The program provides teachers with more than 250 hours of PD spanning two years and support that includes monthly classroom visits. As part of refining and improving eMINTS PD, eMINTS staff integrated the Intel® Teach Elements Program recently, adding a third year of PD to help teachers sustain and build on the first two years of eMINTS PD. The third year combines online and face to face training for teachers to expand their use of project-based learning. Teachers also gain access to Intel's suite of online tools designed to involve students in 21st century higher-order thinking and problem solving.

A decade of evaluation of the eMINTS original two-year program consistently has shown promise in changing teachers' practice and raising student achievement. However, these evaluation studies focused on intermediate elementary students (Grades 3–6), and were either non-equivalent group or pre-post designs with no comparison groups. In 2010, the eMINTS National Center received an i3 (Investing in Innovation) validation grant for a randomized control trial to evaluate the efficacy of the eMINTS PD program in increasing seventh- and eighth-grade students' mathematics and English language arts (ELA) achievement, 21st century skills and academic engagement. By using a rigorous evaluation design and by focusing on middle school grades, this study aims to expand the knowledge base about the effectiveness of the eMINTS' program.

Purpose / Objective / Research Question / Focus of Study:

The current report focuses on the impact after the second year of implementation of the eMINTS program.[1] It addresses the following research questions:

1. What is the impact of the eMINTS Comprehensive Program on the performance of Grades 7 and 8 students in mathematics and communication arts?

[1] The final study report (after the third year of implementation) will also assess the impact the third year of eMINTS PD using the Intel Teach Program Thinking with Technology (eMINTS+Intel Teach), added to the original two-year eMINTS PD program.

2. What is the impact of the eMINTS Comprehensive Program on the 21st century skills, including communication, technology literacy, and critical thinking, of Grades 7 and 8 students?
3. What is the impact of the eMINTS Comprehensive Program on the academic engagement of Grades 7 and 8 students?

Setting:

The study focused on grade 7 and 8 students in 60 high-poverty rural Missouri schools.

Population / Participants / Subjects:

Each of the 60 study schools[2] was randomly assigned to one of three groups: (1) the traditional eMINTS Comprehensive Program, (2) the eMINTS Comprehensive Program plus a third year of professional development using Intel Teach Program courses, or (3) business as usual.[3] Randomization was blocked by the grade range in each school. Of the 60 schools, 30 schools serve Grades PK–8 or K–8 (Block 1), eight schools serve Grades 6–8 or 7–8 (Block 2), and the remaining 22 schools serve Grades 6–12 or 7–12 (Block 3). Enrollment in the study schools was fewer than 200 students, reflecting the small and rural aspects of the sample schools. Across both eMINTS and control schools, about 5 percent of students were minorities, 58 percent qualified for free or reduced-priced lunch, less than 2 percent were English language learners, and between 12 percent and 13 percent had an identified disability. The mathematics and communication arts analytic samples (RQ1) each consisted of about 3,000 students, and the analytic samples for 21st century skills and student engagement (RQ2 and RQ3) each had about 2,500 students.

Intervention / Program / Practice:

The eMINTS Comprehensive Program consists of professional development for school principals, district and school technology coordinators, and classroom teachers. Teachers receive about 240 hours of professional development across two years in which they learn to design high-quality inquiry-based lesson plans, implement inquiry-based learning strategies, build community among teachers and students, and integrate technology into classroom instruction. Before the start of the school year, a certified eMINTS instructional specialist (eIS) is assigned to a collection of schools—according to his or her geographic location—to provide formal and individualized professional development to teachers and communicate with principals and technology coordinators. eISs facilitate the ongoing development of a school-based leadership team within each school to support implementation and ensure that the required technology infrastructure and equipment functionality are maintained in eMINTS classrooms. During the first year of professional development, teachers receive 126 hours of formal professional development in 26 sessions that are held throughout the school year. At the end of the first year, teachers spend up to 12 additional hours developing a classroom website. The Year 2 curriculum

[2] Two treatment schools dropped out before the first year of implementation, and one control school closed after the first year of implementation

[3] Note that although the schools were randomized into three groups because of the addition of Intel Teach to the two-year eMINTS program in Year 3, for the Year 2 analysis, which is the focus of this report, there are effectively only two groups: (1) Groups 1 and 2 combined (eMINTS); and (2) Group 3 (Control).

focuses on classroom management, website enhancement, assessment, interdisciplinary teaching and learning, and the development of multimedia and online projects. One session each year is reserved for teachers to travel to an eMINTS school and observe a certified eMINTS teacher. During both years, eISs supplement these formal professional development sessions with nine to 10 on-site and individualized coaching sessions (about 14 hours total) and within-building communities of practice where teaching staff meet to share ideas, collaborate on online project development, and deepen their existing understanding of concepts embedded in the eMINTS instructional model. Finally, eMINTS provides teachers with support materials and just-in-time learning opportunities through online learning communities to help teachers improve their practice over time.[4]

Research Design:

This study used a cluster randomized design that randomly assigned 60 high-poverty rural Missouri middle schools to one of three groups in Fall 2010 (Year 0). Schools assigned to *Group 1* receive the eMINTS two-year PD program (eMINTS) in 2011-12 and 2012-13 (Years 1 and 2); *Group 2 schools* receive eMINTS two-year PD in 2011-12 and 2012-13 (Years 1 and 2) plus a third year of Intel® Teach PD (eMINTS+Intel Teach) in 2013-14 (Year 3); and *Group 3* schools conduct business as usual (BAU) with no exposure to the eMINTS or eMINTS+Intel Teach (Control) in Years 1 through 3 (the duration of the study), and then receive eMINTS two-year PD in 2014-15 and 2015-16 (Years 4 and 5). To remove extraneous variation due to differences in grade configuration, randomization was blocked by the grade range in each school (Block 1: P/K-8 schools; Block 2: 5-8, 6-8, 7-8 schools; Block 3: 6-12, 7-12 schools). Note that although the schools were randomized into three groups because of the addition of Intel Teach to the two-year eMINTS program in Year 3, for the Year 2 analysis, which is the focus of this report, there are effectively only two groups: (1) Groups 1 and 2 combined (eMINTS); and (2) Group 3 (Control).

Data Collection and Analysis:

Table 1 summarizes data collection plans for student outcomes from spring 2011 to spring 2014. Student outcome data includes Missouri Assessment Program (MAP) test scores in ELA and mathematics. Students' 21st century skills are measured using annual 21st Century Skills Assessment from Learning.com (Condon, C., Dawson, M., Molefe, A., & Swanlund, A., 2009). A student survey is used to measure students' engagement and academic orientation.

Intent-to-treat estimates of impacts on student outcomes were obtained using two-level hierarchical regression models to adjust for the clustering of students within schools, and block fixed effects to control for the randomization of schools within blocks. The models also incorporated baseline student characteristics (prior achievement, grade, race/ethnicity, free/reduced price lunch status, limited English Proficiency (LEP) status, provision of an

[4] The focus of this report is student outcomes. However, the study will also collect and answer questions related to teacher outcomes and fidelity measures. Teacher outcomes will be measured through annual surveys and classroom observations. Fidelity measures include observations of PD sessions, logs detailing in-classroom coaching activities, and audits of technology resources at each school site.

individualized educational plan (IEP), and gender); teacher characteristics (years' teaching experience, degrees held, and gender); and school mean prior reading achievement. The overall impacts are presented as averages of district-specific impacts obtained from the regression models, weighted by the number of schools in each block. The mathematics and communication arts analytic samples (RQ1) each consisted of about 3,000 students, and the analytic samples for 21st century skills and student engagement (RQ2 and RQ3) each had about 2,500 students.

(Please insert table 1 here.)

Findings / Results:

Estimated impacts after the second year of implementation on all student achievement outcomes—mathematics, communication arts, and 21st century skills—were not statistically significant. Impacts on student engagement are negative (with a 0.25 effect size) and statistically significant, indicating that student engagement was lower in eMINTS schools than in the control schools.

Conclusions:

As more states adopt the Common Core State Standards which aim to "provide a clear and consistent framework to prepare our children for college and the workforce" (http://www.corestandards.org/about-the-standards), the need to validate programs that provide teachers training and support to understand and use standards-based instruction and assessments is urgent. As one such program, the eMINTS PD program, which is gaining widespread use, warrants a rigorous evaluation to inform practice not only in Missouri but in all states that are currently implementing or are planning to implement it.

In addition, this study will contribute rigorous empirical evidence to a limited research base on the integration of technology and its mediators and moderators in mathematics and English Language Arts (Roschelle, et al., 2010; Dynarski et al., 2007). In particular, findings will address gaps in the field's understanding how technology and student-centered learning strategies (e.g., problem-based learning) can be integrated in classrooms to impact students' 21st century skills (Shear, Novais, and Moorthy, 2010; Shear et al., 2009).

It is important to note, however, that by design, the eMINTS Comprehensive Program is a two-year professional development program, and eMINTS+Intel adds a third year to the original program length. In this second year of implementation, teachers assigned to the eMINTS only and the eMINTS+Intel groups were offered the same comprehensive two-year eMINTS program; however, teachers in the eMINTS+Intel group have not yet received a third year of training using the Intel Teach Program course training. As a result, this Year 2 study compares the group of treatment schools assigned to eMINTS or eMINTS+Intel to the schools assigned to the business as usual group. *According to the program developers, full program implementation is designed to take about three years; that is, teacher and student effects are optimized after a minimum of three years of implementation. Therefore, the results of the Year 2 analyses presented in this report should be interpreted with caution.*

Appendices

Appendix A. References

Condon, C., Dawson, M., Molefe, A., & Swanlund, A. (2009, August). *Rasch analysis of items based on the ISTE-NETS-S technology literacy standards for 5th and 8th grades pretest)*. (Available from Learning Point Associates, 20 N. Wacker Drive, Suite 1231, Chicago, IL 60606).

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Shear, L., Novais, G., and Moorthy, S. (2010) *ITL Research: Executive Summary of Pilot Year Findings*. Seattle: Microsoft. Available at http://www.itlresearch.com.

Appendix B. Tables and Figures

Table 1: Student Data Collection Timeline

Outcomes	Spring 2011 (Year 0 – baseline)	Spring 2012 (Year 1)	Spring 2013 (Year 2)	Spring 2014 (Year 3)
MAP test (mathematics, ELA)	X	X	X	X
Student 21st century skills test	X	X	X	X
Student survey of academic engagement	X	X	X	X