A MIXED-METHODS STUDY OF THE IMPLEMENTATION OF DIGITAL INSTRUCTIONAL TOOLS IN URBAN SCHOOL DISTRICTS

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Implementation of Digital Tools

- "Digital tools" = products used as part of a digital instructional program or intervention
  - Hardware (e.g. laptops)
  - Supplemental instruction (e.g. online tutoring program)
  - Software programs and modules (e.g., online software, credit recovery courses)
- Limited and mixed evidence base on effectiveness of digital tools in improving K-12 student learning and achievement

Research questions

- How are the digital tools being **implemented in practice?**
- What **associations** do we observe between student characteristics, their engagement and use of digital tools and their academic progression and achievement outcomes?
- What **malleable factors** at the level of the tool, classroom and school hold the most promise for improving student academic achievement?

Theoretical frameworks

- **Sociotechnical theory**: starts with human action and examines how it enacts structures embedded in technology
  - Individuals and their social settings shape both understandings and use of technologies in a dynamic process (through recurring interactions) and their potential for increasing student achievement
- **Heeks' Design-Reality Gap model**: addresses frequent mismatch between intended and actual uses of technology, and factors such as financial constraints that can limit their implementation in useful ways
- **ISTE critical conditions** for effectively leveraging technology for student learning

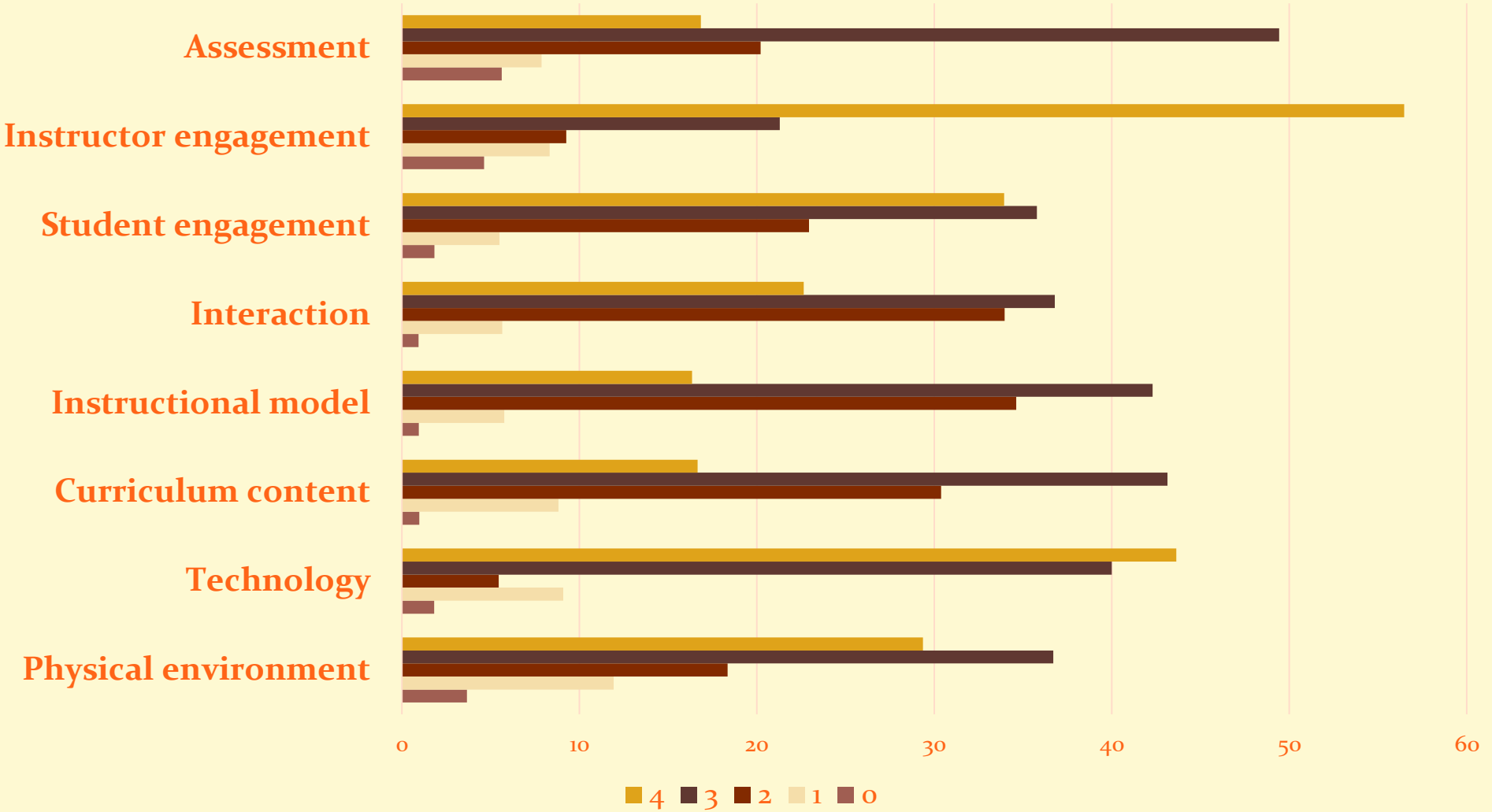
The Logic of Improving the Implementation of Digital Tools

Theoretical foundations	Inputs	Activities	Outputs	Short-term outcomes	Medium-term outcomes	Long-term goals
• Socio-technical theory • International Society for Technology Education's 14 critical conditions for effectively leveraging digital tools to improve student learning	**Structural properties of digital tools** • Online instructional programs • Installed software • Internet or intranet access **Users of digital tools** • Students prioritized for use • Teachers • Instructional and technical staff support **Districts** • Financial resources • Technology initiatives • Technology support • Professional development **Technology vendors** • Digital tool delivery • Training and technical support	**Enacted technology structures** • Online, out-of-school tutoring • Online instruction for course-taking, credit recovery • Personalized learning strategies • Blended learning **Malleable factors** • Vision, planning and management • Training, professional development, capacity building • Technology access, reliability, vendor technical support • Curriculum frameworks and pedagogic approach • Assessment, accountability for closing achievement gaps • Physical settings	• Hours of student tutoring • Logged time on task in online instructional program (and idle time) • Instructional quality • Skill development • Course progression • Time to course completion • Assessment data	• Course completion • Credit accumulation • Quiz grades (in online instruction) • Course grades (in online system and school records) • Standardized test scores	• High school graduation • GED completion • Growth in academic achievement • Achievement gaps by race and socioeconomic status	• Growth in academic achievement • Achievement gaps by race and socioeconomic status • Post-secondary education and training • Certifications and degrees • Labor market outcomes

Data sources

- *Quantitative* analysis of students enrolled in three different digital tools across two, urban school districts
  - Standardized tests, administrative data for managing digital tool service provision, and district student transcript and demographic data for 2010-11-2014-15 school years
- *Qualitative* analysis of providers (2014-15)
  - 110 observations across MPS and DISD of full instructional sessions with digital tools, with standard observation tool
  - Teacher interviews
  - Document analysis

Findings: Ratings of Sessions



Findings: Malleable factors

- Some evidence of a ***shared vision***, yet mixed alignment of vision to *systematic plans* for implementation
- ***Capacity and training of instructors*** for using the tools and integrating them into instruction differed within and across settings and was largely inadequate
- ***Reliable connectivity and equitable access*** *to the technology and opportunities for learning* are not consistently observed, yet critical to effective use of digital tools

Findings: Malleable factors

- Opportunities for ***student-centered learning and blended learning,*** both in the curriculum and instructional strategy, varied widely
- Meaningful and frequent ***assessment*** of student learning integrated into the tools, but not routinely accessed by those who could make the resulting ***data transparent*** and informative to all stakeholders
- The ***physical setting*** where digital tools were used differed greatly in its support of and conduciveness to student learning

Next steps

- Complete *qualitative fieldwork* in 2015-16
- *Link observation ratings* to malleable factors
- *Link vendor data* on digital tool use with student record data and test scores from school district
  - Rich vendor data on student idle and active time for each session, course participation and completion, course grades and test retakes; completed credits, etc.
- Continue with *formative feedback* to school districts and vendors

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