Being Research-Based and Research-Minded in Helping K-12 Mathematics Education

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Why Research?

- Informing practice (critical especially in the context of very diverse and high-poverty urban schools and school districts)
- Developing proof of concept for future grant proposals benefiting schools
- Knowledge generation
How does *Research* improve K-12 math education?

- Professional development of teachers
- Teacher quality
- What works, what does not work
- Barriers for teachers to transfer new learning into their classrooms
Professional Development

Core features of effective professional development (Darling-Hammond, 2018; Desimone, 2009; Loucks-Horsley et al., 2010):

a) rigorous content focus,
b) active learning,
c) collaboration,
d) models of effective teaching practices,
e) frequent feedback and reflection, and
f) long-term duration.
Teacher Knowledge

• Mathematical knowledge for teaching (MKT; Ball, Thames, & Phelps, 2008)
• Technological pedagogical content knowledge (TPACK; Mishra & Koehler, 2006)
Teacher Quality

- Professional background
- Motivational beliefs
- Instructional practices
- In-service training, professional development, coaching, etc.
Adapted from Goe (2007)
Teacher Instructional Practices

• Self-reported practices
• External observations
Social Cognitive Career Theory

- Individual
- Motivational and behavioral
- Contextual

(Lent, Brown, & Hackett, 1994)
Student Motivation towards STEM

- Self-efficacy
- Task value
- Utility value
- Interest
- Identity
Student Persistence in STEM

• Course-taking behavior
• Achievement (e.g., grade, GPA, test scores)
• Intentions pursue advance courses, extracurricular activities, and a career in STEM
Teacher Quality Framework

Teacher Characteristics
- Gender
- Race/ethnicity
- Beliefs

Teacher Qualifications
- Certification
- Education
- Experience

Instructional Practices
- Strategies
- Emphasis

Career Expectation after College

Contextual Factors

Personal Factors
- Gender
- Race/ethnicity
- SES

Motivation
- Self-efficacy
- Identity
- Utility
- Interest

Behavior
- Course-taking
- Test performance
- Course effort

Social Cognitive Career Theory
Methods

• Both qualitative and quantitative approaches
• Pre- and post- self-reported surveys including Likert-scale items, open-ended responses, demographics, and professional background
• Paper-pencil assessments of teachers for mathematical knowledge for teaching
• Interviews
• Classroom observations
• Student achievement data
• Administrative data about teachers
RUSMP Research Products

Teacher motivation and knowledge development (Corkin, Ekmekci, Parr, 2018; Ekmekci, Papakonstatinou, Parr, & Shah, 2019; Ekmekci, Papakonstantinou, & Parr, 2015)

Impact of Summer Campus Programs on teachers (Corkin, Ekmekci, & Papakonstantinou, 2015; Ekmekci, Corkin, & Papakonstantinou, 2015a; 2015b; 2015c)

Barriers and facilitators for transfer from PD to classrooms (Corkin, Coleman, & Ekmekci, 2018; Corkin, Ekmekci, & Coleman, 2017)
Impact of teacher qualifications on student achievement (Corkin & Ekmekci, 2017; Corkin & Ekmekci, 2019; Ekmekci & Corkin, in press; Ekmekci, Corkin, & Fan, under review; Ekmekci, Corkin, & Papakonstantinou, 2015b)

Impact of summer camps on students’ STEM motivation (Ekmekci & Shah, 2018; Koyuncu & Yildirim, 2019)

Students’ STEM outcomes (motivation and achievement) (Ekmekci & Cavlazoglu, 2016; Ekmekci & Corkin, 2019; Ekmekci & Sahin, 2018; Sahin, Ekmekci, & Waxman, 2017a, 2017b)
RUSMP Research Highlights

• Impact of Summer Campus Programs for teachers
• Impact of teacher qualifications on student achievement
• Barriers and facilitators of transfer from PD to classrooms
• Impact of student summer camps on students’ motivation towards STEM
• Impact of teacher qualifications on students’ motivational and achievement outcomes in math (national data)
THANK YOU!

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