Fidelity and Beyond: Developing and Using Implementation Evidence in Research and Development Projects
Fidelity and Beyond: Developing and Using Implementation Evidence in Research and Development Projects
## Common Guidelines (IES & NSF, 2013)

<table>
<thead>
<tr>
<th>Type of Research</th>
<th>Focus of Implementation Research</th>
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<tr>
<td>Design and development</td>
<td>Develop measures with evidence of technical quality for assessing the implementation of the intervention in an authentic education delivery setting</td>
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<td>Develop evidence demonstrating the project’s success in implementation (feasibility of implementation)</td>
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<td>Efficacy, impact, and scale-up</td>
<td>Study reports should document implementation of both the intervention and the counterfactual condition in sufficient detail for readers to judge applicability of the study findings.</td>
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<td>Identify the organizational supports, tools, and procedures that were key features of the intervention implementation. If no evidence of a favorable impact is found, the project should examine possible reasons (e.g., weaknesses in implementation, evidence that raises questions about particular aspects of the logic model).</td>
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</tbody>
</table>
Panelists

Bill Penuel (Moderator)
*University of Colorado Boulder*

Sara Heredia
*University of Colorado Boulder*

Jessica Rigby
*University of Washington*

Jennifer Russell
*University of Pittsburgh*
Why “Beyond Fidelity”? 

• Fidelity addresses the question, “Is it possible?”
• If the answer is “no,” then it is difficult to know why, if implementation research focuses only on whether teachers implemented.
  – Needed are methods for identifying the learning problems local actors face
  – Needed are theories relevant to different levels of organization in schools.
Studying Implementation

Policy and implementation research offer multiple lenses for studying implementation:

- **Individual-Personal** (self-efficacy, knowledge for teaching, stages of concern)
- **Interpersonal** (social norms, informal collegial interactions)
- **Organizational** (alignment, competing institutional goals and priorities)
Informing Design

• Design supports to help teachers address some of the challenges to implementing innovations that can be anticipated based on past evidence (Weinbaum & Supovitz, 2010).

• Adapt professional development on the basis of variation in implementation (Harris, Phillips, & Penuel, 2012).
Your Questions
For More Resources

http://researchandpractice.org

http://learndbir.org
SCIENCE TEACHERS’ COLLECTIVE SENSEMAKING: A CONCEPTUAL AND ANALYTIC FRAMEWORK FOR UNDERSTANDING IMPLEMENTATION

Sara C Heredia
University of Colorado, Boulder
PI Dr. Erin Furtak
University of Colorado, Boulder

Sequencing of ‘correct’ ideas

Increasingly sophisticated ideas

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<td>No variation</td>
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<td>No transformationist ideas</td>
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Grant No. 0953375
Average number of minutes each teacher spent using formative assessment tools in the classroom during the evolution unit each year

[Bar chart showing the average number of minutes spent on formative assessment tools each year for Midville, Monroe, and Sagebrush.]
Sensemaking

- Reorganization of activity after change to work environment
- Retrospective and prospective communication
- Ambiguity and uncertainty

(Weick, 1995)
Teachers’ collective sensemaking

- Interpret and act on messages about reform
- Resources for sensemaking include:
  - Perceptions about teaching and learning
  - Experiences with reform
  - Shared understanding of their students and their school/district

(Coburn, 2001; 2004; Spillane et al. 2002)
Count of teachers’ references of organizational aspects of their work environment in professional development meetings at Monroe

Frequencies

Year 1

Year 2

Year 3

- Pacing guide
- District tests
- School Improvement Project
- Students

15
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<th>Year of PD</th>
<th>Change</th>
<th>Uncertainty or Ambiguity</th>
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<td>The pacing guide changed from 9 to 6 units of instruction across the school year and moved Evolution to the end of the year.</td>
<td>Teachers were unsure what they needed to teach in the first part of the school year and then were confused about what was left out.</td>
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<td>2</td>
<td>Kim left the school and Pamela (physics teacher) took over as lead science teacher. The planning responsibility shifted to Donna.</td>
<td>How students would act or do during new types of activities. Donna in particular was concerned her students wouldn’t focus and get work done.</td>
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<td>3</td>
<td>The entire administration in Y1 and Y2 were fired and a new administrative staff was hired in their place.</td>
<td>Teachers talked a lot about the expectations for rigor and higher level thinking by the new administration and there was a lot of ambiguity about how that was measured and evaluated.</td>
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Process of sensemaking

(Weick, Sutcliffe & Obstfeld, 2005)
And to be honest I feel like although we didn't get to all of these [referring to pieces of learning progression]
“we had what 2, 3 weeks to teach evolution...we were spending like one day sometimes on these big things so and then having to move on and feeling the crunch and not having enough time to really focus on and I know that's something we've always dealt with. Do we just do surface level on lots of things or do we go deep on a few?”
Process of sensemaking

I think that's going to make a big difference this year because we aren't doing deep surface on a lot we are going to be doing deep on a few.

Plausible Pathway Forward

Retrospective Interpretation
Well and without having seen the [pacing guide] as far as it goes with natural selection, evolution, it's hard to pick where we should go.
Year 1 planning tool

**Step 1: Setting Learning Goals**

- Science content
- Overarching learning goal
- Big idea question
- Supporting learning goal

**Step 2: Finding Out What Students Know**

- Assessment purpose
- Placement in unit
- Assessment activity
- Data to be collected about student learning

**Step 3: Anticipating Feedback**

- Probable student alternative conceptions
- Feedback ideas

Learning Progression

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Sample Data Analysis Plan

Formative Assessment: _______________________

- Concept Assessed: (Use LP and/or CAP document language)

  - Student Idea
  - Student Idea
  - Student Idea
Implications

- Supports localized design and implementation
- Local sources of ambiguity and uncertainty
Acknowledgments

- Thank you to Bill Penuel and Erin Furtak for their feedback.
- I also want to thank the teachers at Monroe for their hard work and dedication to our professional development.

This material is based upon work supported by the National Science Foundation under Grant No. 0953375. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.
Teacher Learning Opportunities: changes in the framing of teacher instructional talk in collaborative meetings

Jessica G. Rigby
Vanderbilt University, Peabody College
(soon to be University of Washington)

Christine Andrews-Larson
Florida State University

I-Chien Chen
Michigan State University
Big Picture Goal: support district implementation of high quality, inquiry-oriented math instruction

Significant reorganization of teacher practice (Cobb & Jackson, 2011)

One mechanism: teacher collaborative time
(Louis & Kruse, 1995; McLaughlin & Talbert, 2006)

In teacher collaborative time: opportunity to think about, talk about, and plan mathematics and math pedagogy conceptually

Need for teacher learning
MIST: Middle School Mathematics and the Institutional Setting of Teaching

• What does it take to improve middle school mathematics instruction at the scale of a large urban district in the US?

• Relevant data sources:
  o Interpersonal: informal advice networks and audio transcripts
Study Sample

• Case study (Yin, 2003): Creekside Middle School, 2009-2011

• Primary data sources:
  o Audio recordings of teacher collaborative time (TCT) focused on instruction
  o (Informal Advice Network Surveys)
Conceptual Frame

Framing Theory (Cress & Snow, 2000)

Diagnostic Framing:
- How to help students learn math
- How to help students succeed on tests
- Students can not learn

Prognostic Framing:
- Adjust Instruction
- Cover topics
- Other
Nature and Depth of Talk about Mathematics

(Horn & Little, 2010; Stein & Lane, 1996)

How Teachers Talked about Mathematics

1) Concepts and Explanations
   a. “Conceptual Lite”
2) Terms and Procedures
3) Topic Only
Methods: Analysis

• Qualitative Analysis of Audio Transcripts:
  o Coded in NVivo with deductive and inductive codes
  o Memos, matrices

• Analysis of District Context
  o Examined qualitative and quantitative data across all schools in the district over the same time period to contextualize the findings
Finding One: Content of Mathematics

- None
- Topic Only
- Terms & Procedures
- Conceptual Lite
Finding Two: Prognoses

- Students Can't Do It
- Pass Tests
- Learn Math

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<th>Year</th>
<th>Students Can't Do It</th>
<th>Pass Tests</th>
<th>Learn Math</th>
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<tr>
<td>2009</td>
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<td>40</td>
<td>20</td>
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<td>2010</td>
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<td>50</td>
<td>30</td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td>60</td>
<td>40</td>
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Finding Three: Diagnoses

- Other
- Cover Topics
- Adjust Instruction

Year:
- 2009
- 2010
- 2011
Finding Four: Role of Administrator

Administrative Framing

Administrator Presence
Implications for Design: Teachers

- Kind of math mattered
  - Conceptual lite is unlikely to help students know how to apply mathematical concepts to standardized tests.
  - Given administrator (and district and federal) press on student success on standardized tests, teachers will likely revert to teaching procedures.
  - Need to build teacher capacity to concepts & explanations.
Implications for Design: Administrators

• Administrator press can shift teachers’ attention
  o Provide aligned PD for principals (and APs) as well as teachers, so that they are able to either
    A) give substantive support in implementation (if they have deep content knowledge)
    B) press for ambitious practices (if they don’t have deep content knowledge)
Thank you!

Jessica G. Rigby
jrigby@uw.edu
Social resources for the implementation of ambitious instructional reform

Jennifer Lin Russell
University of Pittsburgh
Scaling Up Mathematics Study

- NSF-funded longitudinal study of the implementation of ambitious mathematics curricula in two urban districts: Region Z & Greene
Scaling Up Mathematics Study

- NSF-funded longitudinal study of the implementation of ambitious mathematics curricula in two urban district: Region Z & Greene

Ambitious mathematics instruction =

- High cognitive demand tasks
- Support for student thinking
- Intellectual authority vested in the discipline
Scaling Up Mathematics Study

- NSF-funded longitudinal study of the implementation of ambitious mathematics curricula in two urban district: Region Z & Greene

- Participating schools
  - 8 elementary schools (4 per district)
  - 48 teachers

- Data (collected at 5 time points over 3 years)
  - Interviews with teachers, coaches, principals, district leaders
  - Observations of classroom instruction, meetings, professional development
Foundational capacities for ambitious instruction
Study districts’ capacity for ambitious instruction

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<td>Surface level similarities (e.g. coaching, professional learning communities) – <strong>but significant differences in quality</strong></td>
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Implementation quality significantly higher in Greene

Stein & Kaufman, 2010
Study districts’ capacity for ambitious instruction

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Social support for instruction: Egocentric math advice networks

**Social Support Network Diagram**

- **Mr. Smythe**
- **Ms. Mannion**
- **1st Grade Team**
- **Ellen Brown**
- **Maria Mulhose (Asst. Principal)**
- **Dehia Tenton (Principal)**
- **Wanda Isaiah (Math Coach)**
- **Dawn Underwood**
- **Professors**
- **Cousin**
- **School PD (with coach)**
- **Teachers in School**
- **Other Coaches in District (and meeting)**
- **AP's in region**

**Categories**
- Other School Staff
- Administration
- Coaches
- District (Central)
- District (Regional)
- Others (Out of District)
Social networks as a source of social capital

- Structure
  - Tie span
  - Tie strength
- Access to expertise
- Trust
- Content of interaction
  - Depth
  - Congruence

Social capital
Social networks as a source of social capital

Extent to which teachers’ interactions with colleagues takes up substantive issues related to teaching & learning
Depth of interaction varies by school and district

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<th>Moderate</th>
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<tr>
<td>School A</td>
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Note. *n* = 315 interactions in Region Z; *n* = 443 interactions in Greene.

Coburn & Russell, 2008
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Coburn & Russell, 2008
System & school leaders influenced social supports

Coburn & Russell, 2008
District policy influences teachers’ social networks

Coburn & Russell, 2008
Supporting sustainability of ambitious instruction

- In year 3 of the study, Greene largely withdrew supports for implementation of *Investigations*
  - Reduced allocation of coaching resources & math PD
  - Reduced grade level team time focused on math
  - Reduced the amount of time for math instruction in elementary schools from 90 to 60 minutes
- Despite a shift in district reform priorities
  - 7 teachers sustained high quality instruction
  - 5 were not able to sustain high quality enactment
Supporting sustainability of ambitious instruction

- In year 3 of the study, one of the study districts largely withdrew supports for implementation of *Investigations*
  - Reduced allocation of coaching resources & math PD
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**SUSTAINABILITY**

- Despite a shift in district reform priorities
  - 7 teachers sustained high quality instruction
  - 5 were not able to sustain high quality enactment
Study methods

- What aspects of teachers’ social networks are consequential for sustained reform-related instruction?
- Longitudinal analysis of teachers’ egocentric advice networks in the Greene district (N=12)
- Employed Qualitative Comparative Analysis to detect relationships between complex sets of network variables and instructional outcomes
Math advice network characteristics associated with sustainability

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<td>Expertise</td>
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Coburn, Russell, Kaufman & Stein, 2012
Math advice network and reform sustainability

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Support from teachers’ math advice networks in years 1 and 2 enabled them to achieve the **understanding of the curriculum and its pedagogical approach** that enabled them to continue to enact it flexibly under different conditions.
Implications for STEM reform

- The quality of teachers’ social networks is associated with their capacity to sustain reform-oriented mathematics instruction

- District and school level leaders can influence the quality of teachers social networks, in turn supporting reform sustainability

- Engineering social supports should attend to the structure and content of teachers professional interactions
References

