Intervening in Instruction to Enhance Teaching and Learning

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WHAT IS INSTRUCTION (IN WHICH WE INTERVENE)?
ELEMENTS OF INTERVENTION?

• INTERACTION.
• ATTEND TO USE.
• USE FILTERED THROUGH USERS’ KNOWLEDGE, NORMS.
• SO, MATERIALS ALONE ARE UNLIKELY TO SUCCEED.
Instruments of practice

– THE INSTRUMENTS
  • Curriculum.
  • Assessments linked to curriculum, timely and usable.
  • Professional opportunities to learn.
  • Incentives.

– DIFFERENCES FROM POLICY?
Policy and Practice

- POLICIES THAT CREATE A NEW EXOSKELETON FOR SCHOOLS.
  - Statewide tests
  - Academic standards
  - Accountability

- HOW GET TO PRACTICE?
USERS AND THEIR SITUATION?

• Generally modest knowledge of science and math.
• School managers know less.
• Conflicting guidance.
• Professional development is weak.

• How one state dealt with these problems.

- POLICY GOAL: More ambitious mathematics instruction.
- Means:
  - Math framework.
  - New state test matched to framework (CLAS).
  - New curriculum materials which embodied ambitious instruction (replacement units).
  - Professional development around both.
WHY REPLACEMENT UNITS?

• Honig text debacle.
• Denham and Akers’ initiative.
• The strategy (implied):
  – Feasible change in classrooms (key topics, 4-6 weeks, compatibility).
  – Build markets and political support.
  – Rely on professionals/non-government.
• The first unit.
• The response.
## Sample Replacement Unit Lesson

<table>
<thead>
<tr>
<th>“SEEING FRACTIONS”</th>
<th>“I was at the amusement park last Saturday. I bought gumballs from one machine—I got three gumballs for eight pennies. My friend told me that she’d found a different machine where gumballs were 12 for 20 cents. How could we compare them to find out which was the better buy?”</th>
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<tbody>
<tr>
<td>Teacher poses problem to class</td>
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<td>Students develop their own method for comparing fractions</td>
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<td>Present and explain methods to others</td>
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<td>Practice</td>
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</table>
Your friend says she has 12 coins that add up to $1.00. She says that one of the coins is a quarter.

A. What coins might she have? Show as many possibilities as you can.

B. Could her 12 coins add up to $1.00 and not include one quarter? Explain your answer. (1993 Sampler of Mathematics Assessment)
California Policy Instruments

• Grounded in practice—materials and assessments used in classrooms

• Educative for teachers
  – As is
  – Through professional development for teachers
    • “Replacement unit workshops”

• Consistent with one another, and with state policy frameworks
LEARNING POLICY: THE STUDY

• Initial case studies (OERI, CPRE, Carnegie, Pew)
  – How did teachers respond to CA math reform?
  – What influenced their responses?

• Survey (NSF, Carnegie, Pew)
  – One-time survey of California elementary school teachers about mathematics
  – 600 teachers responded (60% response rate)
SURVEY ISSUES

• TEACHERS’ OPPORTUNITIES TO LEARN
  - topics (coop learning, diversity, math, assessment)
  - duration.
TEACHING PRACTICE
  - use of materials, assessments
  - instructional methods
SCHOOL CONDITIONS

• STUDENT ACHIEVEMENT (CLAS)
DID THE INITIATIVES AFFECT PRACTICE?

• Special topics workshops = NO effect on teachers’ practice. Continued to use presentation/practice instruction.

• Use of replacement units did.

• Learning about student work on CLAS did.

• Workshops on replacement units did.
NATURE OF EFFECTS?

- Teachers with conditions above used more discussion, investigations, less drill.
- Still, much conventional practice.
- Impact on student CLAS scores, net of SES and school conditions (.3 sd, one yr).
- Special topics = No effect.
- Consistent with research on student learning.
- 10% of teachers. Why?
Conclusions

1. Interventions can change instruction
   - When instruments grounded in practice
   - When instruments consistent (aligned).
   - When teachers have OTL, grounded in practice.
   - When steps in change are manageable, given teachers’ situations.

2. Such interventions can influence learning.
Conclusions (cont’d)

• 3. Context crucial
  – State, National assessments (NAEP)
  – Texts
  – Teacher OTL

• 4. Knowledge counts

• -- Use knowledge to guide improvement, report on effects (basic skills in CA?).

• 5. Plan for incremental change:
  • Professional capability
  • Professional and political support.