Professional Development Design and Outcomes

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Project Description
This study discusses the outcomes of a secondary-postsecondary mathematics development project designed to improve students’ transitions from high school to college mathematics courses.

Theoretical Framework: Teacher Learning
- Wide range of teacher responses to PD (e.g., Seitz & Franke, 2003; Coomes & Franke, 2003; Smith & Stein, 2008; Chinn & Johnson, 2009).
- Complex influences: Three dynamic and reciprocally influential nested systems (Smith & Stein, 2008).
- Personal beliefs, histories, and identities
- School contexts
- Learning or PD activities

Research Questions:
- What are the key characteristics of a PD model that supports teacher learning and change across individual and contextual differences?
- How do secondary and postsecondary mathematics educators respond to this model?
- Do their responses suggest an interplay of personal, school, and PD systems that provides direction for further PD development?

PD Issue and Context
- Goal: use secondary and postsecondary PD to improve student success in transitioning from high school to college mathematics.
- Participants: 43 secondary and 10 postsecondary from 16 high schools, 7 school districts, 2 community colleges, and 2 universities.
- Professional Learning Community structure
- Key Characteristics: High Density of Ideas, Approaches, Types of Collaboration
- Exploration/application of standards, mathematics content, pedagogy
- Student work
- Reflection on practice
- Low Pressure
- Flexible, responsive planning; facilitators as co-learners
- Develop mutual respect, sense of safety in taking risks
- Individuals choose “little changes”

Data Collection and Analysis
- Qualitative case studies with purposeful selection of cases.
- Participant observers: PLC members, planners, facilitators, coaches.
- Data collected through interviews, observations, and artifacts.
- Analyzed for evidence of teacher change, trends in timing and direction of change, apparent prompts for change.

Year 1
Topics and activities:
- Teaching contexts
  - College Readiness Standards (CRS)
  - Content
  - Student attributes
  - CRS-aligned task development
- Rigor analysis (Smith, Stein, & Revell, 1999)
- Student transferability (Baumann, Rausch, & Suchting)
- Lesson design

Issues & Responses
- Team conflicts
- Participant attrition
- Unclear goals & expectations
  - More specific goals, plans, expectations
  - Little observed change

First changes and prompts (Year 1):
- Prompts: Facilitator, with conversations, ideal student attributes
- Student reflections
- Changing teacher & student roles
- Encouraged students to help each other
- Reduced answering, increased questioning
- Increased student problem solving

Background:
- Traditional HS teacher
- Wife math teacher
- Goal to constantly improve teaching skill
- Recent move to new school
- Little PD support, little faculty collaboration
- Off task, distracted during pedagogy PD

Brian Timeline
- Goal: use secondary and postsecondary PD to improve student success in transitioning from high school to college mathematics.
- Participants: 43 secondary and 10 postsecondary from 16 high schools, 7 school districts, 2 community colleges, and 2 universities.
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Year 2
Topics and Activities:
- Year 1 activities plus
  - Classroom case studies (Stein, 2011)
  - Questioning cognitive demand levels (Zambo & Zambo, 2008)
  - Ramp tasks: multiple entry points and extensions; student work on ramp problems
  - Formative assessment
  - Little changes
  - One classroom observation

Issues & Responses
- Team conflicts
- Participant attrition
- Unclear goals & expectations
  - More specific goals, plans, expectations
  - Little observed change

First changes and prompts (Year 2):
- Prompts: New teammates and shared planning period,
  - Watches video of teaching, sees students
  - Likes new level of energy, engagement in class
- Student reflections
- Changing teacher & student roles
- Encouraged students to help each other
- Reduced answering, increased questioning
- Increased student problem solving

Background:
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- Wife math teacher
- Goal to constantly improve teaching skill
- Recent move to new school
- Little PD support, little faculty collaboration
- Off task, distracted during pedagogy PD

Mike Timeline
- Goal: use secondary and postsecondary PD to improve student success in transitioning from high school to college mathematics.
- Participants: 43 secondary and 10 postsecondary from 16 high schools, 7 school districts, 2 community colleges, and 2 universities.
- Professional Learning Community structure
- Key Characteristics: High Density of Ideas, Approaches, Types of Collaboration
- Exploration/application of standards, mathematics content, pedagogy
- Student work
- Reflection on practice
- Low Pressure
- Flexible, responsive planning; facilitators as co-learners
- Develop mutual respect, sense of safety in taking risks
- Individuals choose “little changes”

Data Collection and Analysis
- Qualitative case studies with purposeful selection of cases.
- Participant observers: PLC members, planners, facilitators, coaches.
- Data collected through interviews, observations, and artifacts.
- Analyzed for evidence of teacher change, trends in timing and direction of change, apparent prompts for change.

Year 3
Topics and Activities:
- Year 1 & 2 activities plus
  - Content-focused Summer Institute (Algebra & Functions)
  - Administrator Summer Institute
  - Norms for collaboration, problem solving
  - Three in-school observations & meetings
  - Curricular balance of problem solving, concepts, and procedures
  - Common Core State Standards—Mathematics
  - Unit design

Issues & Responses
- Administrators unaware, uninvolved
- Administrator PD
- College faculty member intimidating
- 1-1 meeting

First changes (Year 3):
- Active participant in PD
- Value of collaboration in both content and pedagogy
- Increased use of student ideas & strategies in lessons
- Value of student independence

Background:
- Traditional HS teacher
- Wife math teacher
- Goal to constantly improve teaching skill
- Recent move to new school
- Traditional HS teacher
- Same text as Brian, advanced credential work
- Disagreed with direction of change
- First year PD partner dismissive of project
- Little observed change

Final Outcomes
- Students take more active roles, less reliance on Brian
- More consistent student problem solving approach
- Interest in ongoing changes to improve student outcomes

Departmental leadership

Year 4
Topics and Activities:
- Year 3 activities plus
  - Content-focused Summer Institute (Geometry)
  - Rich task and rubric development
  - Student engagement and strategies
  - Teacher leadership
  - Student work on Math Placement Test questions (MPT-G)
  - Lesson studies

Issues & Responses
- Administrators unaware, uninvolved
- Administrator PD
- College faculty member intimidating
- 1-1 meeting

First changes (Year 4):
- Active participant in PD
- Value of collaboration in both content and pedagogy
- Lesson study experience
- Increased use of student ideas & strategies in lessons
- Value of student independence

Final Outcomes
- Increased student ideas
- Increased cognitive demand
- Initiation of lesson study with colleagues
- Increased use in standards-based grading
- Increased engagement with secondary teammates

Conclusion: Value of high density, low pressure, little changes approach in supporting individual choice and change

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