Mathematics Teachers and Professional Learning Communities: Understanding Professional Development in Collaborative Settings

Matthew P. Campbell, Mathematics Education, North Carolina State University
mpcampbell@gmail.com

Research Questions

1) Considering the context of this PLC implementation, how well are the teachers operating as a PLC (stage one and two)?
2) What factors are associated with each team being able to exist (or not) as an effective PLC?
3) To what extent are the teachers in each team collaboratively engaged in the types of activities that are commonly found in effective MPD (stage three)?
4) What factors are associated with each team’s success or struggle to make a transition from stages one and two to stage three and engage in effective MPD?

Results

Ratings for Brantley and Elmwood High School

<table>
<thead>
<tr>
<th>Stage</th>
<th>Element</th>
<th>Brantley HS Rating</th>
<th>Elmwood HS Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Collaboration</td>
<td>1.1. Beliefs on collaboration</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>1.2. Shared values and goals</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>1.3. Shared role</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>2. Teacher Learning</td>
<td>2.1. Collective inquiry</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td></td>
<td>2.2. Results orientation</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>2.3. Focus on student learning</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>3. Specialized Growth</td>
<td>3.1. Content focus</td>
<td>None</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>3.2. Use of artifacts of practice</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td></td>
<td>3.3. Implementation of reform-inspired instructional practices</td>
<td>None</td>
<td>Low</td>
</tr>
</tbody>
</table>

Summary

The two teams portrayed very different capabilities of functioning as a PLC

Factors –
- Strength of collaborative norms (stage one)
- Individuals’ values regarding collaboration
- Amount of time spent collaborating
- Ambivalent professional development

The two teams also exhibited different capabilities of incorporating activities found in effective MPD

Factors –
- Ambivalent professional development
- Individual beliefs regarding mathematics and reform-inspired practices

Background

- Importance of teacher in reformed mathematics instruction has led to an increased focus on professional development (Sowder, 2007)
- Characteristics of effective professional development (e.g., Yoon et al, 2007; Garet et al, 2001):
  - Teachers involved in decision-making
  - Focused on students’ thinking
  - Sustained (duration and span)
  - Provides opportunity for collaboration
  - Valued by teachers (Arbaugh, 2003)
  - Plays a role in supporting teachers’ inquiry and problem solving (Loucks-Horsley et al., 1998; Hawley & Valli, 1999)

Context

- Large, urban school district in Southeastern US
- PLCs implemented with goal to improve high school graduation rates and stay current in the field of education

Participants

- Two teams of mathematics teachers in Fall 2008
  - Brantley High School team of five teachers
  - Elmwood High School team of four teachers
  - Both teams focused on Algebra I classes
  - Both teams met for 45 minutes every week

Data Sources and Analysis

- Case study methodology (Stake, 1995)
- Individual data from surveys and interviews
- Individual interviews
- Individual observations
- Team data from PLC meetings

Recommendations and Conclusions

Future research should:
- Take a prolonged look at a team of teachers to analyze growth
- Consider existing professional development alongside the collaborative work of teachers
- Use proven measures of teachers’ content knowledge, pedagogical knowledge, attitudes, and beliefs
- Compare the collaborative work of teachers across levels of mathematics
- Report on ways to focus mathematics teachers’ collaborative work on content in order to replicate the experiences that teachers have been found to have in research

Implications

- Teachers should learn in environments that they are expected to create themselves
- PLCs alone do not address the needs of mathematics teachers
- Need for concurrent professional development to foster collaborative norms and mathematical content and pedagogical knowledge among teachers

Acknowledgements

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