Video Clubs and the Development of Mathematics Teachers’ Professional Vision

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www.professional-vision.org

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Professional Vision

“Ways of seeing and understanding events that are answerable to the distinctive interests of a particular social group.”

– Goodwin, 1994

Teachers’ Professional Vision:

- Ability to perceive meaningful structure in classroom events
Investigating Professional Vision

- What is the nature of mathematics teachers’ professional vision?
- How might video support the development of teachers’ professional vision?
What is Professional Vision?

Classroom Interactions

Selective Attention

Knowledge-based Reasoning
Video-Based Professional Development

Media Tools
- VCR
- Searchable DVD
- Multimedia-based
- Annotation tools

Nature of Video
- Own vs. Others
- Staged vs. Spontaneous
- Produced vs. Raw footage

Task and Social Setting
- Program Goals
- Type of Facilitation
- Individual vs. Group vs. Virtual Group
- Volunteer vs. Required
Groups of teachers watch and discuss video excerpts from their classrooms

- Media Tool
  - Videotapes viewed on VCR
- Nature of Video
  - Participants’ classrooms
  - Spontaneous, raw footage
- Task and Social Setting
  - Various designs possible
What happens in a video club?

- Use professional vision as a lens to explore teacher learning in video club
## Research Design

### Nile Video Club
- 4 middle-school math teachers
- 7 meetings across school year
- Researcher acted as facilitator

### Mapleton Video Club
- 7 fourth-fifth grade teachers
- 10 meetings across school year
- Researcher acted as facilitator
- Pre and post “noticing interview”
- Pre and post class observations

## Data Analysis
- Meetings videotaped and transcribed
- Transcripts segmented into “idea units”
Data Analysis

Idea Units coded for:

- Who initiated segment
- Length of time

<table>
<thead>
<tr>
<th>Selective Attention</th>
<th>Knowledge-Based Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actor</td>
<td>Student, Teacher, Other</td>
</tr>
<tr>
<td>Topic</td>
<td>Math Thinking, Pedagogy, Climate, Management</td>
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<tr>
<td>Stance</td>
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<tr>
<td>Strategy used to explore student ideas</td>
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</tbody>
</table>

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Learning in the Video Club

“Early Meeting”

“I like that they were using dry erase.”

“Late Meeting”

“We’re just trying to figure out how she got five dollars.”
Development of Selective Attention

- A shift in *what* teachers noticed
- Initially, teachers raise issues of pedagogy and climate
- Across video clubs, teachers increase focus on student thinking
Development of Knowledge-Based Reasoning

- A shift in how student thinking was discussed
- From restatements to deep analysis of student ideas
- From description and evaluation to interpretation
At a macro time scale: Across the video club meetings

- Selective attention influenced knowledge-based reasoning
  - Increased attention to student thinking called for new ways to reason about student thinking

- Knowledge-based reasoning influenced selective attention
  - Teachers began to “see” more complex issues related to student thinking
At a micro time scale: Within a single discussion segment

Selective Attention
- Notice that what Brenda said was not clear to them

Knowledge-based Reasoning
- Try to make sense of the meaning of Brenda’s comments

Selective Attention
- Focus on Brenda’s use of the term “correlation”

Knowledge-based Reasoning
- Propose two possible meanings of Brenda’s comments

Selective Attention
- Ask to view additional video from the class discussion

Knowledge-based Reasoning
- Return to analysis of Brenda’s thinking
What happens in a video club?

- Examine influence of video clips on teacher discussion of student thinking
What makes a video clip interesting?

If 1/2 inch = 30 miles

Then 1/4 inch = ? miles
Selecting video clips for teacher learning about student thinking

Three dimensions of classroom video clips of student thinking:

- **WINDOWS into Student Thinking**: Is there evidence of student thinking in the video clip?
- **DEPTH of Student Thinking**: Are students exploring substantive mathematical ideas?
- **CLARITY of Student Thinking**: How easy is it to understand the student thinking shown in the video?
## Research Design

### Mapleton Video Club
- 10 video club meetings
- 25 video clips

### Analysis
- Video Clips coded along 3 dimensions
- Corresponding discussions coded as more or less productive
- Examined relationship between video clips and discussion coding

<table>
<thead>
<tr>
<th></th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
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<tbody>
<tr>
<td><strong>WINDOWS</strong></td>
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<td><strong>DEPTH</strong></td>
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<tr>
<td><strong>CLARITY</strong></td>
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<tr>
<td><strong>FOCUS ON</strong></td>
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<tr>
<td><strong>STUDENT THINKING</strong></td>
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<tr>
<td><strong>MATHEMATICAL</strong></td>
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<tr>
<td><strong>SUBSTANCE OF</strong></td>
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<tr>
<td><strong>DISCUSSION</strong></td>
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<tr>
<td><strong>JOINT SENSE-MAKING</strong></td>
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</table>
Depth must be sustained for productive discussion

- “Blip” clips (short bursts of depth) not always pursued by teachers

<table>
<thead>
<tr>
<th></th>
<th>Halves</th>
<th>Fourths</th>
<th>Fifths</th>
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<tbody>
<tr>
<td>One</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Three</td>
<td>1.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Four</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Five</td>
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**Video Clip Excerpt**

Teacher: 4/2 is 2.0. Mario?
Student 1: I did that Ms. Lempke, but I didn’t put the zero at the end.
Teacher: Okay, will you fix it now and put the zero? You got it? So, what would come after the 2.0?…
Student 2: How come the 3, it doesn’t have the zero at the end?
Low Depth…

Under the right conditions, Low Depth can lead to productive discussions

- “Hmm…” Teachers may examine mathematics more deeply than do students in video

**Video Club Excerpt**

Player 1:

5 2

Player 2:

3 6

Wanda: [I noticed] the way he was counting on the card in the later one….He was counting the groups….I think it was three times six.

Daniel: So what was he doing?

Frances: He was counting one, two, three, four, five, six. And then he was keeping track, so he knew he counted six one time, six the second time, six the third time.

Daniel: Well, then he knows what the meaning of multiplication is.

Wanda: Which is…exactly. I mean, that’s the base.
Both high and low clarity clips can lead to productive discussions

- “What?” clips: What is the student saying?
- “Wow!” clips: That’s such an interesting method!

<table>
<thead>
<tr>
<th>Video Clip</th>
<th>Discussion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>Depth</td>
</tr>
<tr>
<td>High</td>
<td>High</td>
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<tr>
<td>High</td>
<td>High</td>
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</table>
What happens in a video club?

- Use professional vision as a lens to explore teacher learning in video club
- Examine influence of video clips on teacher discussion of student thinking
What is the influence of video clubs?

- Look at individual teacher’s viewing of video outside video club context.
What is the influence of video clubs?

- Look at individual teacher’s viewing of video outside video club context.
- Look at individual teacher’s instruction.
Mapleton video club participants engaged in pre and post-interview

- Teachers viewed video clips from elementary math classrooms
- Asked “What do you notice?”

Mapleton video club participants observed early and late in school year

- 3 teachers observed 3 sequential days
- 4 teachers observed once early and once late in year
Data Analysis

Video Club Interviews:

<table>
<thead>
<tr>
<th>Selective Attention</th>
<th>Actor</th>
<th>Student, Teacher, Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge-Based Reasoning</td>
<td>Topic</td>
<td>Math Thinking, Pedagogy, Climate, Management</td>
</tr>
<tr>
<td></td>
<td>Stance</td>
<td>Describe, Evaluate, Interpret</td>
</tr>
</tbody>
</table>

Classroom Observations:

<table>
<thead>
<tr>
<th>Selective Attention</th>
<th>Patterns in teacher noticing of student ideas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge-Based Reasoning</td>
<td>Strategy used to explore student ideas</td>
</tr>
</tbody>
</table>

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Changes in the Interviews

Pre-interview:  
*Student, Climate, Describe*  
“Students were engaged. You didn’t have just one child just sitting and watching and not contributing. They were all contributing.”

Post-interview:  
*Student, Math Thinking, Interpret*  
“Students were doing patterns. They were counting by 25’s. Someone said they were counting by 20’s. I don’t know if that child was confused, if she didn’t get it, but the other children in the group did and they got to 400.”
# Changes in the Interviews

<table>
<thead>
<tr>
<th></th>
<th>Pre-Interview</th>
<th></th>
<th>Post-Interview</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>Idea Units</strong></td>
<td><strong>Percent</strong></td>
<td><strong>Idea Units</strong></td>
<td><strong>Percent</strong></td>
</tr>
<tr>
<td><strong>Agent</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student</td>
<td>87</td>
<td>58%</td>
<td>Student</td>
<td>104</td>
</tr>
<tr>
<td>Teacher</td>
<td>58</td>
<td>38%</td>
<td>Teacher</td>
<td>35</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>4%</td>
<td>Other</td>
<td>5</td>
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<tr>
<td><strong>Topic</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Math Thinking</td>
<td>43</td>
<td>29%</td>
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<tr>
<td>Pedagogy</td>
<td>27</td>
<td>18%</td>
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<td>Climate</td>
<td>67</td>
<td>44%</td>
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<tr>
<td>Management</td>
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<td>3%</td>
<td>Management</td>
<td>0</td>
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<tr>
<td>Other</td>
<td>9</td>
<td>6%</td>
<td>Other</td>
<td>3</td>
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<tr>
<td><strong>Stance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Describe</td>
<td>70</td>
<td>46%</td>
<td>Describe</td>
<td>46</td>
</tr>
<tr>
<td>Evaluate</td>
<td>42</td>
<td>28%</td>
<td>Evaluate</td>
<td>25</td>
</tr>
<tr>
<td>Interpret</td>
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<td>26%</td>
<td>Interpret</td>
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<tr>
<td><strong>Total</strong></td>
<td>151</td>
<td></td>
<td></td>
<td>144</td>
</tr>
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Changes in Instruction

- Increased attention to student ideas
  - Student ideas become objects of inquiry for teachers

**Early Observation**

T: So 4/2 is 2.0. Mario?
St: I did that, but didn’t put zero at the end.
T: Okay, will you fix it now and put the zero.

**Late Observation**

“I’m interested, I’ve never heard of that.”
“I’d like to know how that came out, but I’m not sure I’m following it.”

- Teachers apply strategies from video clubs to classroom practice
  - Work to make sense of student ideas
  - Use student statements as a resource

**Late Observation**

“So you’re doing partial products as if there’s no decimal point?”
“Stop. What do you mean ‘since there’s two things behind the line?’”
Can we see teacher learning as a result of video clubs?
Can we see teacher learning as a result of video clubs?
Can we see teacher learning as a result of video clubs?
Can we see teacher learning as a result of video clubs?
(Some) Next Steps

Video Clubs

- Explore varied video club designs
- Investigate development of video club norms

Professional Vision

- Look more broadly at nature of teachers’ professional vision
  - What do teachers notice?
  - How do they interpret what they notice?
  - Conducted “noticing interviews” with 48 teachers
Examining Teachers’ Professional Vision

Put teachers’ comments in categories

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Distinguish among comments within a category

Types of comments related to “student math thinking”

Level 1: Identify statements made by students
Level 2: Analyze meaning of student ideas
Level 3: Generalization & synthesis of student ideas
To what extent do teachers notice the same features of video clips?

Distinguish among comments within a category

- **Types of Interpretive Strategies**
  - Self projection
  - Focus on what’s missing
  - Reason outside of video
  - Identify principles
  - Use analogies
  - Storytelling