SCIENCE TEACHERS’ COLLECTIVE SENSEMAKING: A CONCEPTUAL AND ANALYTIC FRAMEWORK FOR UNDERSTANDING IMPLEMENTATION

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Reflect on Enactment

Explore Student Ideas

Enact Tools

Develop Tools

Practice Using Tools

Sequencing of ‘correct’ ideas

Increasingly sophisticated ideas

<table>
<thead>
<tr>
<th>Random Mutations</th>
<th>Transformationist incorrect</th>
<th>Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environment causes change with genetic basis</td>
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<tr>
<td>Unclear or Vague</td>
<td>Unclear usage of ‘adapt to environment’</td>
<td>No variation</td>
</tr>
<tr>
<td>Trait not present</td>
<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.
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
<table>
<thead>
<tr>
<th>Year of PD</th>
<th>Change</th>
<th>Uncertainty or Ambiguity</th>
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<tr>
<td>1</td>
<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)

Bracket and label

Retrospective Interpretation

Plausible Pathway Forward

Ongoing Activity

Students

District

School
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?”
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
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

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