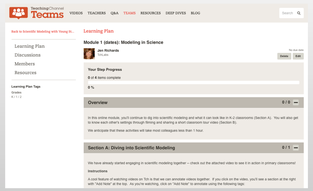
Designing Practice-Based Learning Labs for K-2 Teachers: Initial Lessons Learned

Project Overview

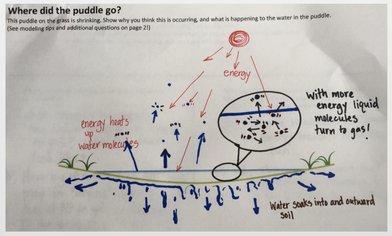


- Designing and studying Learning Labs for K-2 teachers on mathematical and scientific modeling and argumentation
- Use of Tch Plus platform and professional classroom videos

Practice-Based Design Principles for Teacher Learning

Practice-based teacher learning theories (Ball & Cohen, 1999; Grossman, Hammerness, & McDonald, 2009; McDonald, Kazemi, & Kavanagh, 2013) suggest teachers should have opportunities to collaboratively investigate, enact, and reflect on new forms of practice.

1. **Focus on children's thinking, first and foremost**
2. **Engage teachers in mathematics or science practices as learners**
3. **Ground investigation of practices in authentic classroom examples**



4. **Center teachers' collaboration around trying out common activities and practices in their own classrooms**

5. **Engage teachers in iterative cycles of planning, enacting, and analyzing**

What have we learned about effectively translating these principles in online and blended contexts?

Design Principles for Online Learning

Drawing on literature on online learning (e.g., Swan, 2002; U.S. Dept of Ed, 2010) and insights from pilots

6. **Consistently leverage familiar structures and practices to encourage participation**
7. **Structure online discussion so teachers can see and build on each other's ideas asynchronously**

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Northwestern University: Bruce Sherin, Miriam Sherin, Mari Altshuler, Eleanor Anderson, Tracy Dobie, Chris Leatherwood
Teaching Channel: Paul Teske, John Ward

Lab Pilots and Participants through Spring 2017

Mathematics Pilots	Science Pilots
• 48 research participants • 8 cohorts (6 modeling, 2 argumentation), with 3-8 participants/cohort • Average teaching experience: 9 years • 75% had taken an online course previously	• 18 research participants • 5 modeling cohorts, with 2-6 participants/cohort • Average teaching experience: 10 years • Most taught science at least once a week • Half had taken an online course previously

Primary Data Sources

- Participants' contributions
- Pre-post surveys

New Analytic Possibilities:

Text mining techniques to analyze content of posts

For instance, in the modeling Labs, we examined how the meaning of forms of the word "model" varied across posts. To do so, we extracted the text around each use of one of these words, then used a type of topic modeling (Latent Dirichlet Allocation) to examine meanings.

Mathematics Modeling

word	weight	df
visual	0.049	6
process	0.046	12
didn't	0.046	11
paper	0.045	10

word	weight	df
make	0.077	34
sense	0.056	25
make_sense	0.052	14
idea	0.044	11

Science Modeling

word	weight	df
initial	0.043	32
final	0.037	53
sharing	0.028	14
thinking	0.028	49

word	weight	df
heat	0.058	12
going	0.049	14
water	0.049	45
show	0.044	30

Findings & Principle 1:

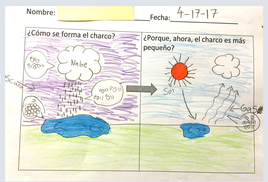
Teachers' noticing and reasoning about student thinking and participation in the scientific modeling Lab

Conducted qualitative analysis of:
- Teachers' online posts (n=242)
- Teacher-uploaded classroom artifacts (n=104)

Theme 1: Noticing student ideas and resources
Surprise at # of ideas and abstract ideas (53% of teachers)
Students using funds of knowledge (73% of teachers)
Adaptations to honor students' ideas (50% of teachers)

During our discussions she (the student) made a personal connection to knowing that steam goes up into the sky. She said that her family made beer and when it got hot the steam went up… She added this idea to her final model.

Theme 2: Considering multimodality
Multimodal nature of modeling -> multiple entry points and communication pathways for diverse young students (93% of teachers)



Productive design elements
Teachers most frequently identified examining student work as beneficial for their learning (53% of teachers), described using work to:
- Collectively dive into student thinking
- Discuss and plan next steps to push thinking
- Consider connections to specific aspects of practice

Ongoing Challenges and Questions

- Designing for/supporting productive, ongoing exchanges among teachers
- Interactively pressing for consistent, deep focus on students in asynchronous context
- Facilitation models that can support larger numbers of participants without sacrificing depth

Findings & Principle 4:

Analyzing use of "I notice…" and "I wonder…" response prompts to support collaboration

Developed coding framework focused on conversational function, applied to individual sentences (n=602) in responses to colleagues' reflections for 5 tasks across 3 mathematical modeling cohorts

Conversational function codes:
- ***Describe***: Drawing attention to something stated in initial teacher's reflection
- ***Interpret***: Providing a new lens for viewing something in a colleague's reflection
- ***Learn***: Asking clarifying questions or requesting information that draws on a colleague's expertise
- ***Share***: Offering suggestions, personal experiences, and/or beliefs to colleagues
- ***Validate***: Providing praise, noting appreciation, or expression alignment with colleagues

Findings
While Validate was the most common function across responses (n=189, 31.4% of all sentences), different patterns emerged among sentences that started with "I notice" and "I wonder":

Function	Total (# of sentences)	% sentences using "I wonder"	% sentences using "I notice"
Describe	14	0%	42.9%
Interpret	104	8.7%	11.5%
Learn	73	15.1%	0%
Share	150	11.3%	2%
Validate	189	1.6%	2.1%

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