Enhancing student engagement and learning with the Modeling; a middle school science and math "Teacher Learning Community" (TLC)

Mentoring and Peer-Peer Interactive Support using videos at Gary CSC

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Northern Indiana Science, Mathematics and Engineering Collaborative

Funding support: the ICHE to the University of Notre Dame and Gary CSC

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The Plan for this session

First - *an introduction to modeling: SIP and activity-based student learning*

Second – a hands-on modeling experience

Third – Mentoring and peer-peer interactions

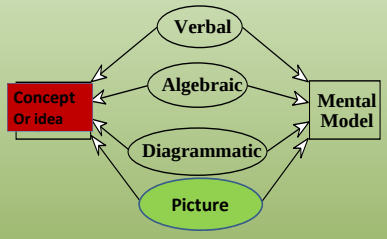
Fourth -- a 2nd (if time allows) hands-on modeling experience

Tonight – a party for all modeling teachers and those interested in modeling……

starting at 6:00 p.m at the RAM restaurant downtown 140 S. Illinois Street, between Maryland & Georgia

What do we mean by "Modeling"*?

MULTIPLE! **Symbolic Representations**



*Modeling in physics & Chemistry as developed at Arizona State University The American Modeling Association – AMTA - http://modelinginstruction.org/

Why modeling?!

- To help students see science (& math) as a way of viewing the world rather than as a collection of facts.
- To make the *coherence* of scientific (& math) knowledge more evident to students by making it more explicit (quantitative).
- *Models and Systems* are explicitly recognized as major unifying ideas for all the sciences by the *AAAS Project 2061 and the NGSS* for the reform of US science (& math) education.

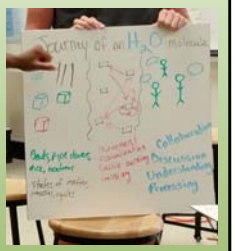
The NGSS Framework of Scientific and Engineering Practices
"The Practice Standards"

1. Asking questions & defining problems
2. Developing & using models ← ←
3. Planning & carrying out investigations
4. Analyzing & interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations & designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, & communicating information

In the science and math classroom, and in a Professional Learning Experience

An important part of the modeling procedure is to give students a chance to show each other (and the teacher)

To help explain –
in their own words
-what they have been learning …..



One way of achieving this ----
---- is to present the students' group activities to the other groups by transferring their group ideas *to large whiteboards*
Which can then be presented (in various ways) to the other students…

Are ALL your science and math classes Satisfying, Intentional and Problem-Solving (SIP) for all your students ? ?

The **SIP principle** [***Satisfying, Intentional Problem-Solving***] describes an effective classroom which uses these characteristics to reach the goal of quality intellectual *student* work.

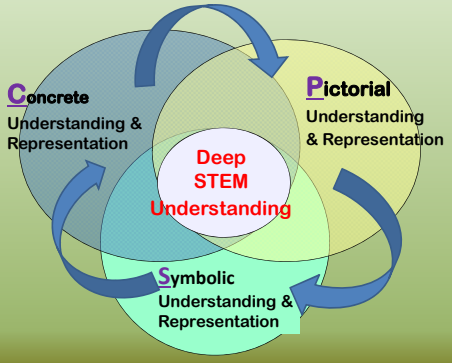
Satisfying: Quality intellectual work which is engaging, intrinsically rewarding, and develops competence and confidence for the student

Intentional: Students constructing models and strategies leading to the students' realization that they are building competence

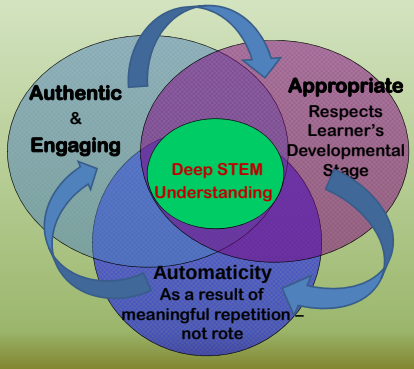
Problem-solving: Students developing their own progress milestones, accomplishing them and explaining their own achievements.

And ALL these characteristics MUST also be part of Professional Learning Experiences

The dynamic C-P-S Principle



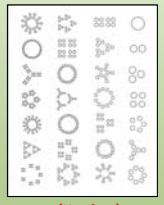
Learning from each other by DOING



An activity to illustrate modeling…

"Patterns" are important in both math and science learning (and in learning from experiences:)

Can you think of the ways they help to develop
1 - CONCEPTS ….
2 - General approaches to problem solving..
3 - Any other applications??
4 - Can you think of explicit examples?



(Handout)

How many PATTERNS can you see in the above Pic? 1, 5, 10….more?

Form groups of 3-4 people *– each group needs a "whiteboard", plus some markers. Use* ***any source or estimate*** *to help solve the problem – but* ***justify*** *your work and answers……*

Prepare your whiteboard for a presentation to everybody,
Include several ***representations***
– e.g. verbal, algebraic, picture, diagram, graph….

Also **include 2 questions** raised by your group……..

→ **Presentations**

Does this exercise trigger any thoughts about how science and/or math learning takes place in **YOUR** classroom?

Discuss this question amongst your group, and write down a few constructive thoughts for discussion with the whole class.

Building a Teacher Learning Community

Teaching can be a solitary activity – you in your classroom.

Research shows that collaboration with both peers and mentors can have a huge impact on both teacher morale and learning outcomes for students. (Beg, Borrow, Steal…)

We help Teachers build a mutually supportive community.

HOW?

- **Facilitating meetings between groups of teachers (already happening in some schools – weekly meetings, etc)**
- **Using video to record lessons that can be shared with mentors and peers (N.B. Mentoring, not evaluating!!!)**

Why video?

- It allows for collaboration and mentoring, even if an observer cannot be physically present in the classroom.
- It allows for objective discussion based on fact rather than 'memory'.
- Discussions can be focused.
- It allows the teacher to reflect on their own practice.
- Can be used for lesson study model enabling teachers to mutually plan and evaluate.

How will it work?

- A teaching session (or part of one) is recorded and uploaded.
- The teacher annotates reflections at key points.
- The observer responds to questions and reflections, and asks their own questions in a mutually supportive environment.

Best Foot Forward: The Harvard Toolkit for Classroom Observations Using Video

Leveraging Video for Learning

Approach 1: Video for Self-Reflection
Approach 2: Video for Peer Collaboration
Approach 3: Video for Virtual Coaching (mentoring)

Approach 4: Video for Evaluation ***Not in our TLC***

References: http://cepr.harvard.edu/files/cepr/files/l1a_teacher_video_selfie.pdf
http://cepr.harvard.edu/files/l1b_video_self_analysis_rubric.pdf

Approach #1: Structured self analysis

Problems

1. **Information overload**. Paying attention to all details, like keys swinging or the number of utterances of "um." Distractions are important to note, but it takes an enormous amount of intention to filter out less significant details and focus on teaching and learning.
2. **Excessive self-criticism.** Teachers are their own worst critics because they care deeply about their craft. Watching oneself can be extremely challenging if nitpicking becomes the dominant stance.
3. **Watching the wrong film star.** Self-reflection doesn't mean making the teacher the star of the film. Student action must play a prominent role in a teacher's observation strategy. When Teacher C moved past watching herself and started listening to her students, she gained new insights into student thinking and behavior.

Approaches 2 & 3: Video for Peer & Mentor Collaboration

"A video club": groups of teachers analyze one another's teaching. Teachers move from general judgments of the lesson to more specific, evidence-based thinking as result of club participation. By solving problems together, they effectively met their individual goals and deepened their relationship with the curriculum.

OR

"Teacher Rounds": meet to discuss the lessons, and teachers commit to making a specific change in practice. The cycle closes with teachers videotaping their implementation of these changes and sharing that video with colleagues. In this way, video is used as an accountability mechanism for making feedback actionable.

We use the Torsh-Talent System for both these approaches…..

In each model, there should be a designated peer facilitator, a well-structured dialogue or protocol for discussion of instructional practice, and a teacher-identified challenge or goal. In order for this to work, teachers must give as much helpful feedback as they receive.

We use the Torsh-Talent System for both these approaches:
The teachers decide
(a)The preferred system
(b)Rubrics/norms to be used in the video interactions….

Let's practice and discuss……??

A to Z of Peer Coaching

Pre-observation agreement : agreed aims and focus of observation/s;

Timing and length of observations - a well-planned ten minutes may be sufficient;

a code of conduct for the 'visiting' observer teacher

acceptable forms of recording/note-taking;

a guarantee of feedback

shared criteria that will be used to analyse observations; confidentiality (including boundaries with other procedures such as performance management).

Golden rules/ Rubrics for observers giving feedback to fellow-teacher generated videos

A few example prompts to promote FRIENDLY self-evaluation and interactive discussion might include:

---- "Given your intention to ….. (evidence) …… how do you think the lesson went?"
---- "When ….. (evidence) …… why do you think that was?"
---- "I noticed/observed ….. (evidence) …… how does that match your view?"
---- "What do you think would happen if …..?"
---- "What have I said that you think makes a positive contribution to your learning?"
---- "What would you like me to observe in future?"

Application form / request for more information about the Summer 2017 Modeling Academies

Evansville and SW Indiana Districts– (at North HS)
Year 2 high school math and (chem, phys, bio) 1 week June 12-16 [closed]
Year 1 high school math and (chem, phys, bio) 2 weeks July 10-21
contact: Vic Chamness - vic.chamness@evsck12.com

Gary and NW Indiana – (at Bailly Preparatory Academy)
Middle school science and math teachers 2 weeks July 24 – August 4
contact: Gordon Berry – hgberry@nd.edu

IPS and nearby districts – (at IPS Professional Development Center)
7-12 grade math and (chem, phys, bio) teachers 2 weeks June 19 – 30)
contact: Ashlee Scherwinski - scherwinskia@myips.org or HG Berry

Name _____ **Grade** _____ **Subject** (circle) **Ma Ph Ch Bio MS**

School/District _____ **Email** _____

Workshop (circle one) **Evansville Gary IPS [email or hand in or mail]**

Reflecting on today's session

Who is doing the thinking and learning?
Who is making connections?
Did you use all 8 science practice standards?

1. Asking questions & defining problems
2. Developing & using models
3. Planning & carrying out investigations
4. Analyzing & interpreting data
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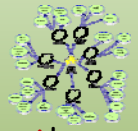
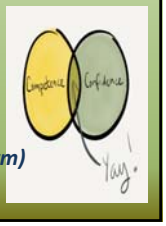
The Essential ABCs of Learning

Always Be Conversing



Always Be Connecting

Always Build Competence
(Confidence)



Thank you for being here! …Any Questions?
(Please Pick up the "generic" application form)
And/or sign in for 1 or more workshops…