

AHSI MINT Support Team Visit - Debrief Snapshot

Problem Solving

Observations:

- Questions to students included, "How'd you do it?" and "What's another way?" - nice reinforcement
- "Problem" seemed to be defined in a really narrow way rather than an authentic and more natural definition of a problem.
- GSP activity was mostly demonstration - didn't appear to be as much of a constructivist activity as mentioned in the morning prep meeting
- Worksheets and review problems didn't allow for problem solving in the sense of higher order thinking - more procedural

Suggestions/Recommendations:

- Provide rich, highly engaging questions that give students the opportunity to approach from many different ways - share and compare methods, analyze approaches, connect to prior learning, etc.
- Actively listen for students to pose and ponder questions and take advantage of these opportunities to probe for deeper analysis and understanding
- Whenever possible, make connections to real-world contexts/references that students can relate to (i.e. weight loss problem connected to The Biggest Loser)
- Over-arching questions you may want to pose to students when working through a problem - "Is your solution/response reasonable or unreasonable? How do you know?"
- Allow for more self-discovery with GPS lessons - let students go. Pull back at certain benchmarks for full class instruction and use meditational questions to deepen student thinking about the geometric relationships investigated
- Whenever possible, create a culture of problem solving by grouping students, working on a rich problem or set of problems that are of interest to students, identify patterns, different ways to solve - share and discuss as a group and include written explanation/reflection.

Student Engagement

Observations:

- Students took to working with computers and GSP right away
- Students were completing work in all classes observed though many didn't appear to be fully vested in the learning - being curious, inquisitive, taking personal ownership in the learning
- Students appeared to enjoy opportunities to work together/help one another
- A few opportunities presented for students to put problems on the board

Suggestions/Recommendations:

- When having students record problems on the board, allow time for explanation and probing questions from teacher and peers
- HRHS staff to clearly define what they mean by "student engagement" - what it looks like, sounds like. Suggest looking at Phillip Schlechty's work on engagement (*Working on the Work*) and how to develop lessons that match strategy with student need. Additional resources - *Math Tools, Grades 3-12: 64 Ways to Differentiate Instruction and Increase Student Engagement* (Silver, Brunsting & Walsh), and *Best Practice* (Zemelman, Daniels, & Hyde)
- Increase rigor and expectations - students encouraged to use higher order thinking and do more authentic work would lead to an increase in student engagement

Vocabulary/Math Literacy

Observations:

- Word wall/vocabulary bulletin board posted in Phil's and Richard's classrooms
- Quick check of vocabulary list in Richard's class - student (Kenya) shared that students get about 1-2 new words each time words are added to the list
- Math vocabulary/terms used by teachers during classroom lessons - (P) points, line segment, ray, midpoint, distance, measure; (Ri) equation, variable, expression, fraction, quotient; (Rh) equation, like terms, solve, variable, etc.
- Phil included some verbal review of vocabulary at the end of the lesson

Suggestions/Recommendations:

- Target specific vocabulary/terms of importance for a class lesson/activity - have students tally each time the term is referenced (helps to focus concentrated attention on specific terms)
- Incorporate meaningful use of word walls - refer to during lesson, use for formative assessment
- Use a Frayer Model to deepen understanding of vocabulary (see specific Math example in Appendix I)
- Broaden the scope of this area to include math communication. Instill an expectation that students use appropriate math vocabulary when presenting their work, making conjectures, explaining their processes, etc.
- Encourage students to be precise with their language - use math to read and describe the world

Retention Strategies

Observations:

- Traditional, teacher-centered strategies
- Lessons tended to be worksheet driven with lower level questions
- Phil provided a quick recap of geometric terms with visual representation at the conclusion of his lesson

Suggestions/Recommendations:

- Introduce interesting and rigorous problems that are connected to content students need to learn. Present them in engaging ways where students are encouraged to work together, talk about their ideas and solutions, defend their reasoning, and apply their learning to other situations
- Use concrete models to demonstrate math concepts (e.g. operations with integers using two-colored chips; factoring polynomials using algebra tiles). Virtual manipulatives can be found online - National Library of Virtual Manipulatives (<http://nlvm.usu.edu/EN/NAV/VLIBRARY.HTML>)
- Consider use of modified Cornell notes (see diagram below)

Notes provided by teacher	Practice problems Tips Questions
Reflection/Mental Model/Definition in own words, etc.	