**emergent math**

An oversimplified model of an inquiry-based lesson, with visual aids

Posted on 10/14/2011

Last week, I mentioned that, having begun to attempt to slay one of the two giants of inquiry-based math instruction, I'd be steering into a potentially trickier aspect of inquiry based instruction: namely that of instruction and facilitation.

Most of us learned math like this.
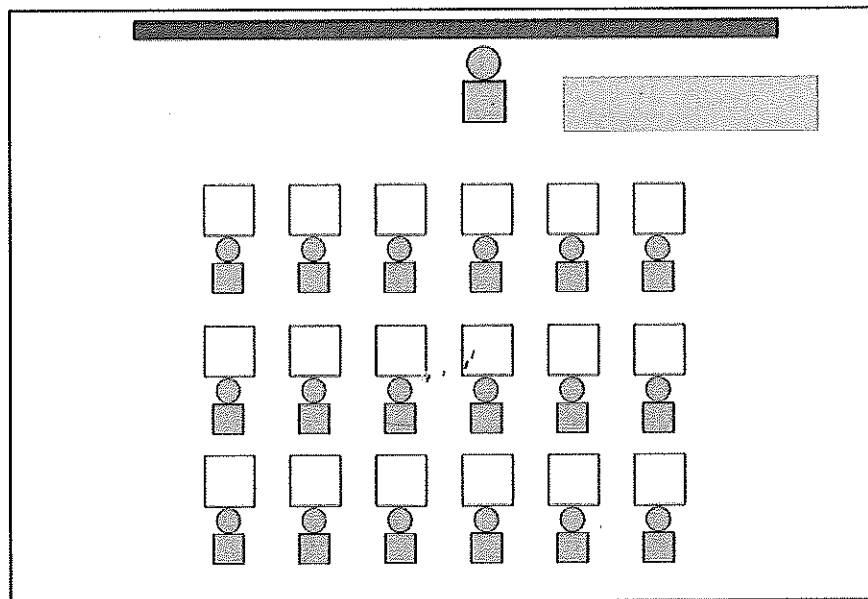
We have decades of evidence suggesting that this method of instruction is not only ineffective, but damaging – both to students' confidence and love of the subject (see Jo Boaler's awesome "What's Math Got To Do With It" for more). But honestly, I think that battle has essentially been won. Most of us (I think) are in agreement that this isn't the ideal way to teach math, or any other subject. But the question is "how?"

Even in more-or-less traditional high schools nowadays, you'll see something more like this.
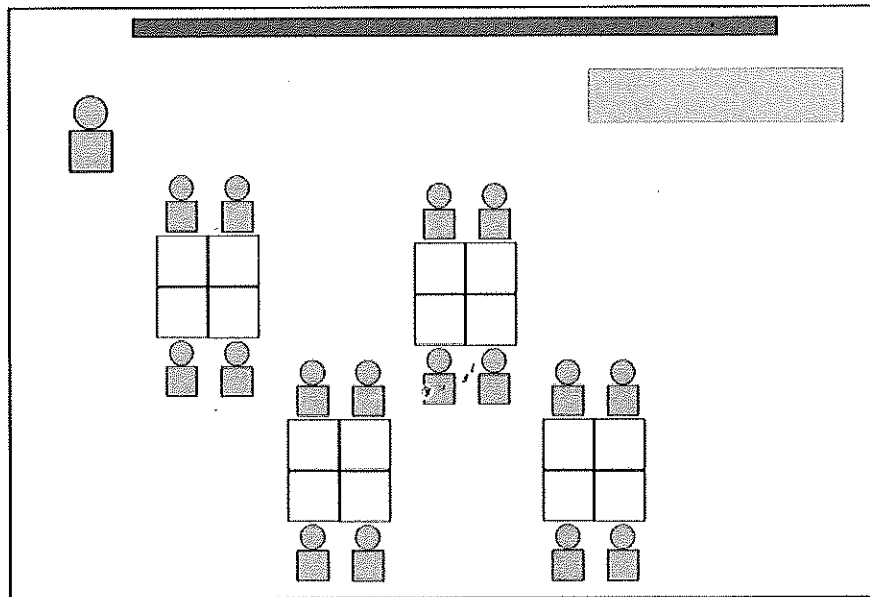
Students need to be actively and collaboratively involved in the problem solving process, but what does that really look like? How do we give students both the freedom of solving a problem collaboratively and in novel ways, while still providing enough support to help students along the way?

That's where the real art of teaching lies. One has to be nimble to adjust instruction based on student need, but prepared enough to be able to anticipate and address the need.

So let's start with the "ideal" inquiry based lesson, start-to-finish, then in future posts we'll go back and analyze the process further.
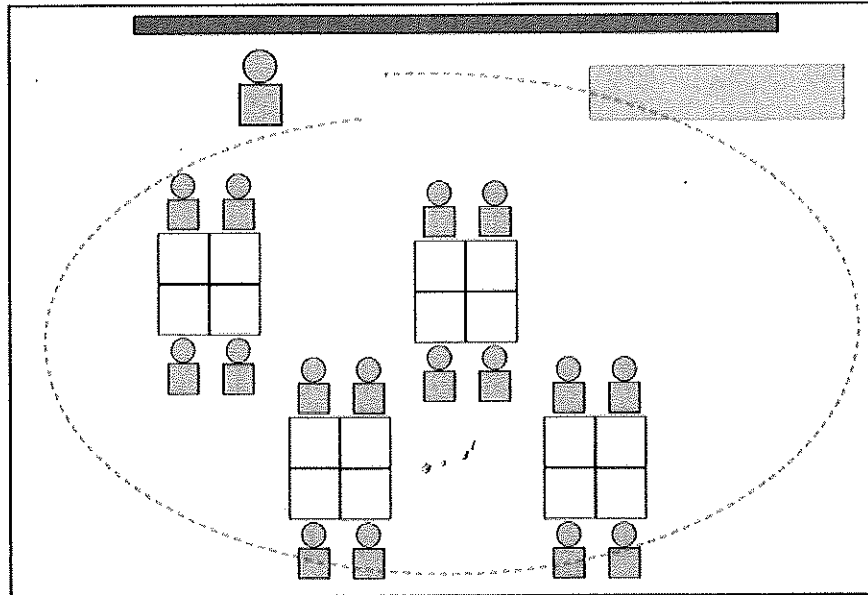
A model of inquiry-based instruction.

Step 1: The problem is posed.
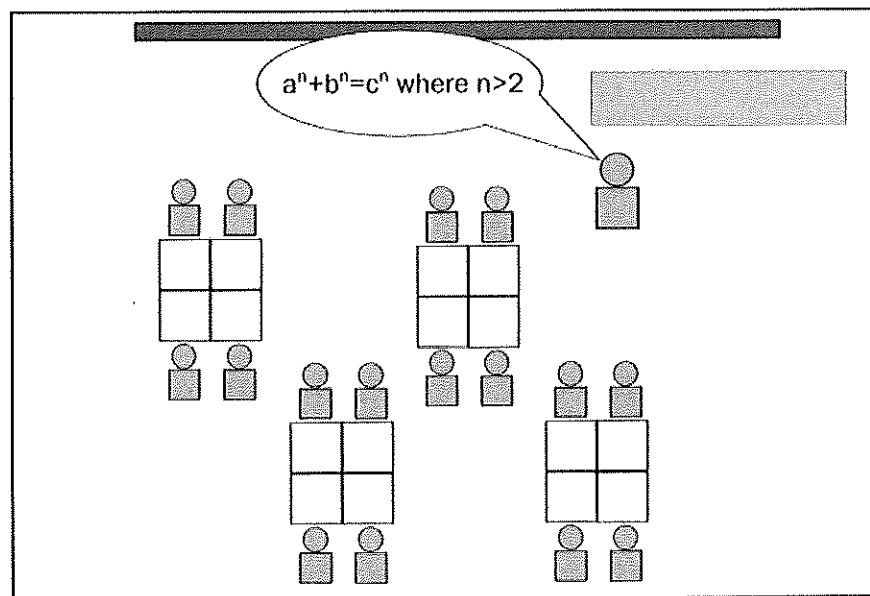
Usually the problem is introduced along with some sort of class or group discussion facilitated by the teacher where students **identify key components** of the problem and **begin strategizing.**

Step 2: Students begin work on the problem.

As the students work together toward a solution, the teacher checks in with each group and each student, **probing for understanding** and **answering any clarifying questions.**
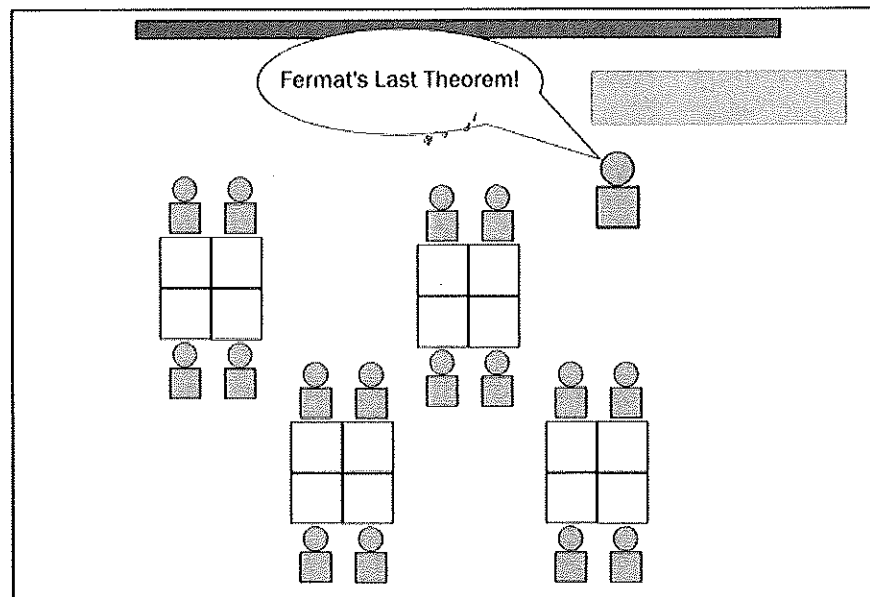
Step 3: Questions begin popping up from the students.
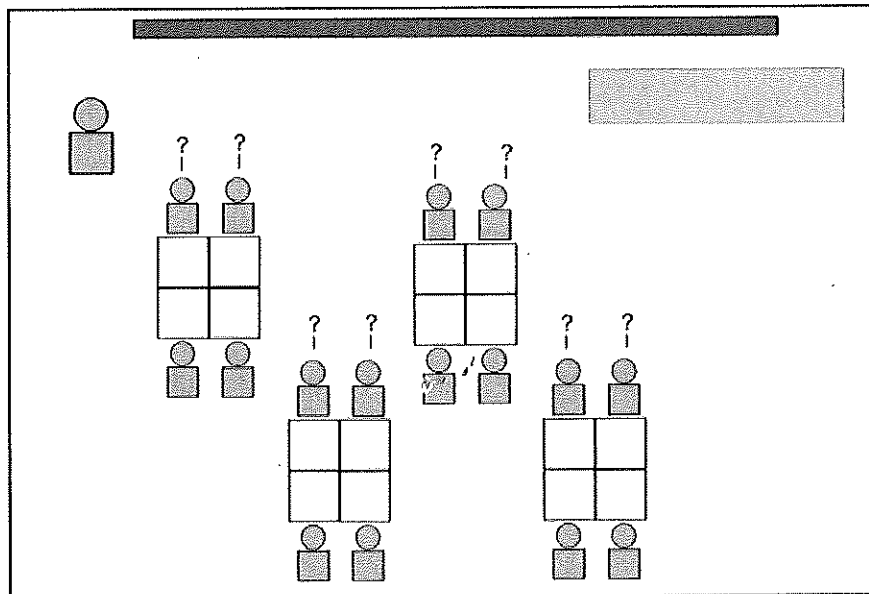
As the students are working through the problem, **questions** related to the intended content begin to crop up. As students begin to struggle with the problem a "critical mass" (or "tipping point) of perplexity occurs.

Step 4: Appropriate scaffolding and/or instruction is provided by the teacher.

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Based on the students questions, the **teacher provides instruction** in some format. Maybe it's a lecture, maybe it's groups sharing out, maybe it's analyzing samples of student work, maybe it's a research resource, maybe it's an investigation, activity or lab.

Step 5: Students work on the problem some more, after being provided instruction.
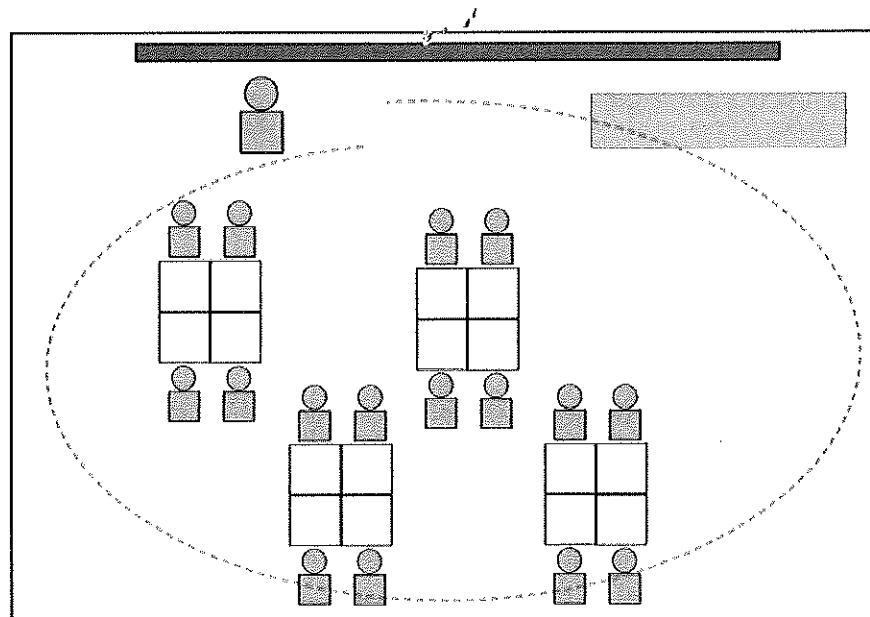
Having acquired the requisite content knowledge from the instruction, **students proceed** to work on the problem.

Step 6: Students solve the problem.
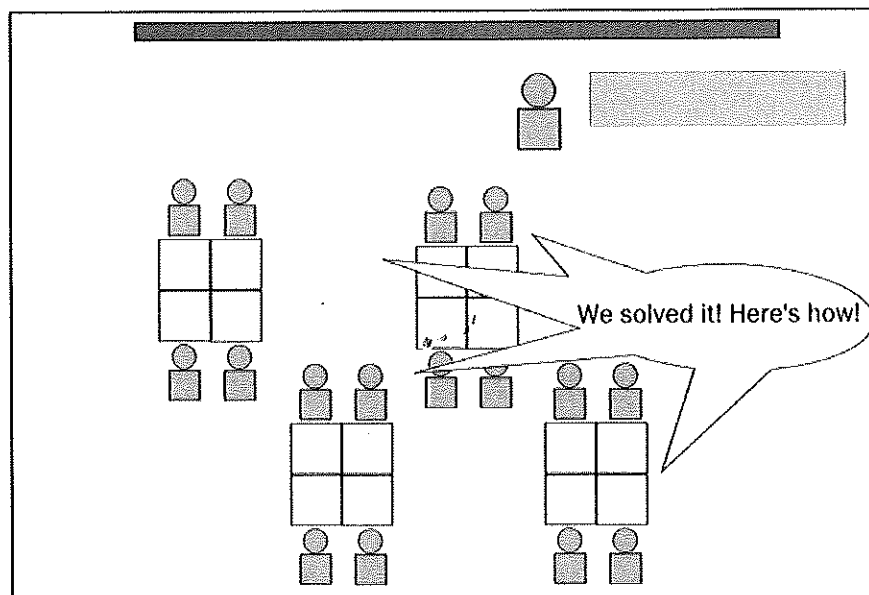
Students finalize their **solutions**. Usually some sort of **informal sharing out or presentation** is accompanying. The teacher asks probing questions to get students to make generalizations about their work and promote sense-making.

Fin.

Now, this is clearly an over-simplified model of what a classroom actually looks like. Every step along the way is fraught with different challenges and obstacles to understanding which need to be addressed. I hope that the simplicity of this model does not imply that inquiry-based instruction is simple: **far from it!** For example, in our fantastical little classroom above students appeared to be all having the exact same question at the exact same time. Obviously that doesn't ever happen in classrooms. (also, it looks like we lost a couple students from the first image of this post to the next)

I would also like to formally declare that I don't have all the answers. Frankly, I'm not sure I have very many answers at all. **I do have a lot of questions though.**

In order to address the monumental challenges, we'll be looking at each step in depth over the next few weeks, discuss particular challenges, differentiation strategies, etc. My preference would be to get your input and suggestions, since I'm far from an expert.

But before I do, what do we think of this little utopian situation? Did I miss anything? Would you swap out one of the steps for something else? In my desire for simplicity I may have glossed over something or left something out entirely. Please chime in in the comments.

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