Level 3 Mathematics - The Timelessness of Mingle, Match and Mate

PEEL in Practice: 1300 ideas for quality teaching
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The whole-school practice of SINE (Success In Numeracy Education) and its accompanying assessment of growth points has prompted a push on the development of number sense in our students. According to test results a considerable number of children were unable to demonstrate the attainment of growth points expected at their grade level. While many could do pen and paper activities few could articulate their understanding. The dreaded spectre of rote learning loomed high on our agenda. I'm sure many teachers have experienced the insistent lurking of the sinking heart syndrome associated with the knowledge that their students have demonstrated the ability to remember rather than understand. All that work for nothing!!

One thing most teachers have in common is the conviction that we can make a difference. Driven by this notion and armed with a good repertoire of generic teaching strategies (from PEEL, of course) I started off 2005 determined not to repeat many of my past mistakes. Throughout the past two terms I had experienced many highs and lows, particularly while teaching mathematics. One example I want to share is my entry lesson into a new unit about equivalent equations.

My starting point was to engage the students in an activity which they would find enjoyable but allow me to assess their existing knowledge of equivalent equations using whole numbers. Enter 'Mingle, Match and Mate'. This procedure gets students, carrying a card, out of their seats (Mingling), searching for the student who has the card that Matches their own. When they find that person they sit down (Mate) and hence make the search for matches easier for those who are left. The procedure requires students to think about the meaning of what is on their card in order to recognise it in a different form. Two sets of (colour coded) cards are required with one card in each set referring to the same thing, but by a different clue. This procedure involved moving, thinking and talking - three things which Grade 3/4 students excel in, although one cannot guarantee that their thinking will be related to the task at hand. I decided to apply this to the idea of equivalence and with each pair of cards card having different equations that equaled the same number.

Inspired by optimism, I sat the whole class on the mat and verbally explained the task, wrote very specific instructions on the blackboard and modeled how to play the game. This involved a considerable time, but the time invested in setting up for success is worthwhile as such a multi-modal approach ensures that each child understands what to do. The by product is that the teacher is then free to study student engagement and observe learning.

The unfolding scene was interesting with children moving around the room purposefully obviously driven by the desire to find their partner. Circulating around the room, I could hear lots of discussion revolving around the different ways of doing mental calculation and how you can use relationships between numbers to simplify the solving of equations. Of particular interest was how some of the more able students were explaining to other students why some numbers are easy to calculate and not others.
The odd child was viewed to be standing off by themselves. When approached it was revealed that they needed longer to work out the solution to their equation. I was happy with this state of affairs as it showed a determination to succeed rather than jump in and guess the solution. It also suggests that such children will persevere despite any external pressure. There is an inbuilt component of competitiveness in this activity (deriving from the status of being the first to find their partner) which could undermine the student who needs lots of thinking time. However, in this particular instance there were no evident casualties due to the innate commonsense of such children who removed themselves from the heavy traffic areas.

Once the students located their mate, they sat down at a table and worked together to produce a third equivalent equation. The laissez faire nature of this activity meant that children of different ability ended up together. This provided a good opportunity for the more able mathematics students to do some peer teaching. As I wandered around, it was pleasing to hear such statements as 'the same amount', 'the same value' and 'it looks right'. I could also hear comments related to number compatibility and commutative property such as 'they go together' and advice to change the addends around to make calculation easier. As I hadn't done any lead-up teaching to the unit, this meant that the children were applying existing knowledge and using their own developing number sense. What better way for my battlers to learn about multiple representation and number relationships!

After the pairs had produced their third equivalent equation, they returned to the mat and the whole grade discussed their existing notions of equivalence and presented their third equations. My role was simple - I was the scribe responsible for writing everything down. At the completion of the discussion, three blackboards had been filled with knowledge of and representations of equivalence. Not only was every child in the class exposed to a broad range of learning about equivalent equations I had also achieved a good overview of the current state of understanding in my classroom. Of course this meant that I had to redesign my tentatively planned unit in order to meet the diverse range of student needs from exploring simple equivalent equations to equivalent fractions.

I have to admit that I had envisaged that this activity would take about 20 minutes. Wrong, again! In reflection, my lesson plan should have looked more like this:

1. 10 minutes - instructions on how to play activity.
2. 20 minutes - Mingling, Matching and Mating
3. 15 minutes - Scribing
4. 20 minutes - Going Further.

It's pretty clear that the activity required twice as long as had been planned for. And what is this 'going further'? Upon finishing the scribing section, the children asked if they could return to their tables and produce as many equivalent equations as possible. Who was I to say no? I was having as much fun as my students were and a small amount of white-out (on my work program) would quickly account for the 15 minutes of Humanities time eaten into.

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