Picture Puzzles – Rod Mats

I recently modelled a Fraction lesson to a Year 6 class in Canberra. As it was towards the beginning of the school year, and I was an unfamiliar teacher to these students, I chose a Rod Mats Fraction lesson. I wished to explore whether these Year 6 students had a strong conceptual understanding of fractions or merely a superficial, symbolic strategies based understanding.

To scaffold the students into the activity, I chose to introduce them to the fraction lesson via Picture Puzzles Rod Mats. Unfortunately the class did not have

iPads where students could work in pairs independently. So I presented the lesson to the whole class on the Interactive White Board.

From the very beginning, the students were intrigued. I think it was the first time many of them had experienced Cuisenaire Rods. Picture Puzzles Rod Mats stepped the students through the task of building a fraction rod mat with Orange (10) as the whole. Each student could experience success as they answered the questions asked of them by the software program. Students also had a means of checking their answers with the next slide. This way any incorrect assumptions could be rectified before moving forward.
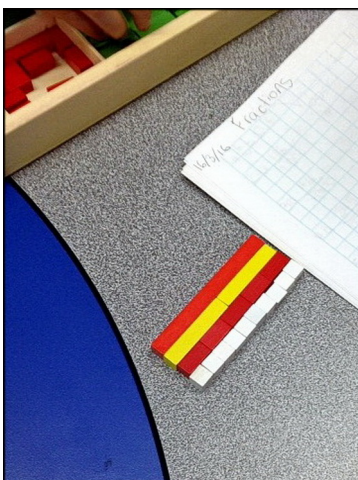
What was important is the task helped establish, or affirm, the three constructs of fractions:

- know the whole
- know how many parts the whole is divided into, and
- know those parts are equal.

Additionally the task used word fraction language at the beginning, e.g. halves, fifths, tenths and not its symbolic representations. This allowed those students less confident in fraction work to be able to make and name the parts of the fraction rod mat easily and see the equivalent or related fraction.

Making a tentative start….	Easily scaffolded into the task
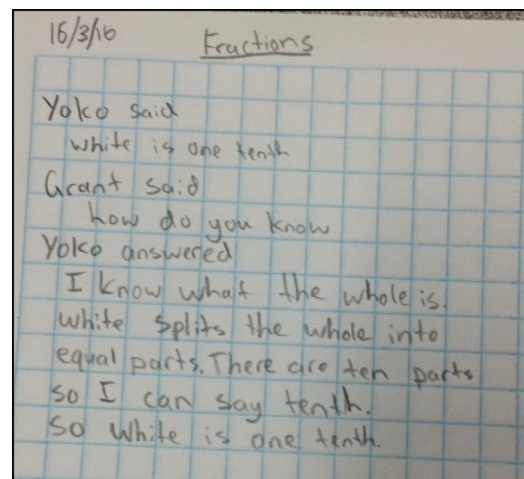
While I did not complete the whole puzzle in the allocated time, I was able to scaffold all learners in the room. Above are some pictures with explanations of students' thinking.

However, there were a number of students who answered symbolically straight away, when completing the slide shown here.

Only when I questioned the student whose work is displayed below, did he draw the picture to the side of his symbolic answer.
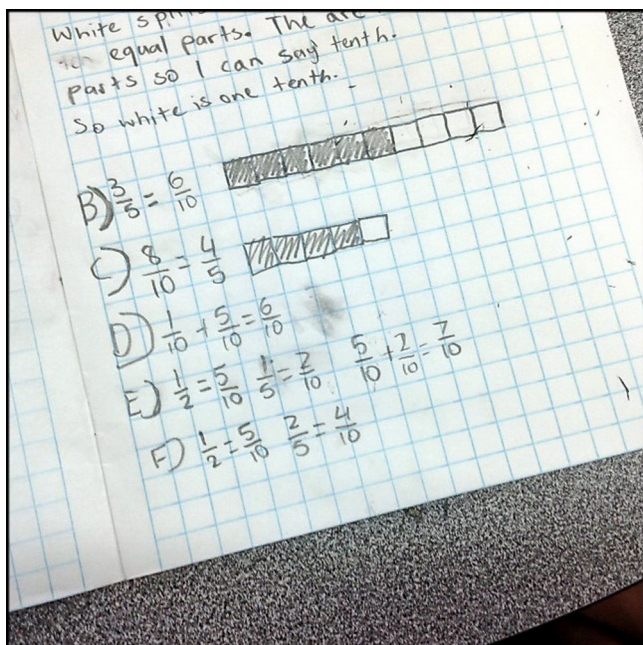

When I asked him why does $\dfrac{1}{2} = \dfrac{5}{10}$ (question f), he could only answer by saying 'he simplified the fraction by dividing by five'.

When questioned further 'why divide by five?' the student could only articulate that five was a factor of both the numerator and a denominator.

Clearly this student had a good grasp of the strategy to simplify fractions, but did not understand the equivalent concept underpinning this strategy.

I continued to question the student asking him to physically show me, on the Rod Mat, one half and then five tenths. I asked the student to place the half on top of the five tenths .Again I posed the question, 'why divide by five?'

Suddenly the *aha* moment occurred and the student realised why dividing the numerator and the denominator by five made sense. I posed the question, 'so in another fraction example, why would you divide a numerator and denominator by four to simplify a fraction?' and the student could answer the question successfully. Thereby satisfying me that his learning had moved further up Bloom's taxonomy to generalising about simplifying fractions.

In conclusion, the Picture Puzzle Rod Mat was a successful and enjoyable lesson for all involved. It has a low threshold yet allows for a high ceiling which scaffolds students through the activity, gives the teacher the luxury of time to observe students' work and question for deep understanding.

Madonna Pianegonda, Teaching and Learning Officer – Numeracy
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