September 2012

Press for Learning– A Teacher's Reflection

AS MATHS TEACHERS, WE WANT STUDENTS TO UNDERSTAND MATHS, NOT JUST TO RECITE FACTS AND PERFORM COMPUTATIONAL PROCEDURES.

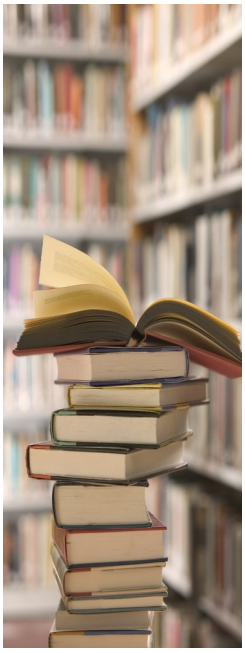
We also know that allowing students to explore and have fun with mathematics may not necessarily stimulate deep thinking and promote greater conceptual understanding.

Tasks aligned with the curriculum, promoted by the NCCA and PMDT and connected to students' lives, still may not challenge students to build more sophisticated understandings of mathematics. The actions of the teacher play a crucial role.

What does "Press for learning" look like in the classroom? What follows are thoughts of a teacher reflecting on the "Press for learning" rating of her 5th year classroom.

"Pressing for learning helps my students think more for themselves instead of always relying on me."

INSIDE:



WHAT THE RESEARCH SAYS....

- When we "press" students to think conceptually about mathematics we require them to provide reasoning that justifies procedures rather than simply stating the procedures themselves .
- Many researchers (Cobb et al, Fennema and Carpenter, Kazemi,) have shown that the higher the "press" in the classroom the more the students learned .
- "Press for learning" can be measured by the degree to which you
  - emphasise student efforts
  - focus on learning and under standing
  -support students autonomy
  - emphasise reasoning more than producing correct answers

PREVIOUS WORK

We had spent a number of lessons working through activities that encouraged my students to represent patterns in tables, graphs and generalised expressions. I was hoping that I had empowered them to use these multiple representations to solve problems and I presented them with the problem on the next page in an attempt to assess their learning.

How it went....

Before giving the task I toyed with the idea of leaving it totally open-ended but decided that, since this was the first such activity I had tried with this class, I would guide them a little by scaffolding the task.

I decided to include the following by way of guidance

On graph paper, show all the four sided paddock designs that Rosie can make with 16 units of fence. Label them so that Rosie can see which one has the largest area

Suppose that Rosie decided to use 24 units of fence. What designs would be possible?

The girls worked in groups because I wanted them to share their interpretations and solutions and develop new understandings. I had intended moving from group to group listening to and joining student conversations but very quickly I realised that I was going to have to change my strategy.

The girls were really unable to work in the way I had hoped; they didn't get "stuck in" to the problem and I felt distinctly uncomfortable as I felt I was losing control of the class. There were a lot of people off task just sitting chatting. When I said "folks get on with the work please" some started to ask out loud "How long is a fence?", "Is it area or perimeter?". I even heard someone say "I hate Rosie."

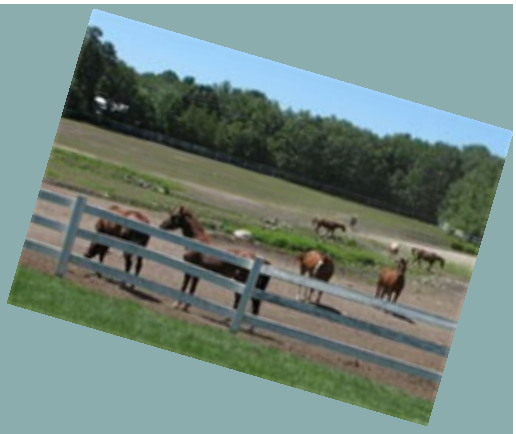
I was tempted just to direct the learning for them and simply tell them what to do, but I resisted the urge.

I called the class to order and said to the whole class "1 unit of fence is equal to a width on graph paper".

On Reflection:

On reflection I think I should have called the class together and said something like "I hear a lot of you asking how long is a fence? Why do you need to know this? How will this help?" then I could have interrogated their thinking more .This action on my behalf would probably have had a higher "press" score.

THE TASK…



Rosie is designing a paddock for her horse. She has looked at lots of designs, and has decided two things:

- She wants a paddock that is in the shape of a rectangle.
- She wants a paddock that will give her horse the largest possible area.

Rosie has 16 units of fencing to use. The sides of the paddock must be made up of whole units of fencing (a side cannot be 2½ units long).

On graph paper, show all the four-sided paddock designs that Rosie can make with 16 units of fence. Label them so that Rosie can see which one has the largest area

Suppose that Rosie decided to use 24 units of fence.

What designs would be possible?

Which one would have the largest area?

Is there a general rule for figuring out which type of design will give the largest area for any length of fence?

I really was surprised at how they could not get started on the task. They really were stuck on the idea of having 16 fence units and the idea of area and perimeter.

Nobody could think of a strategy to get started so, eventually, I got everyone sitting around the room and I picked up 16 pens to represent the 16 units of fence and I did out one situation to get them started.

On Reflection:

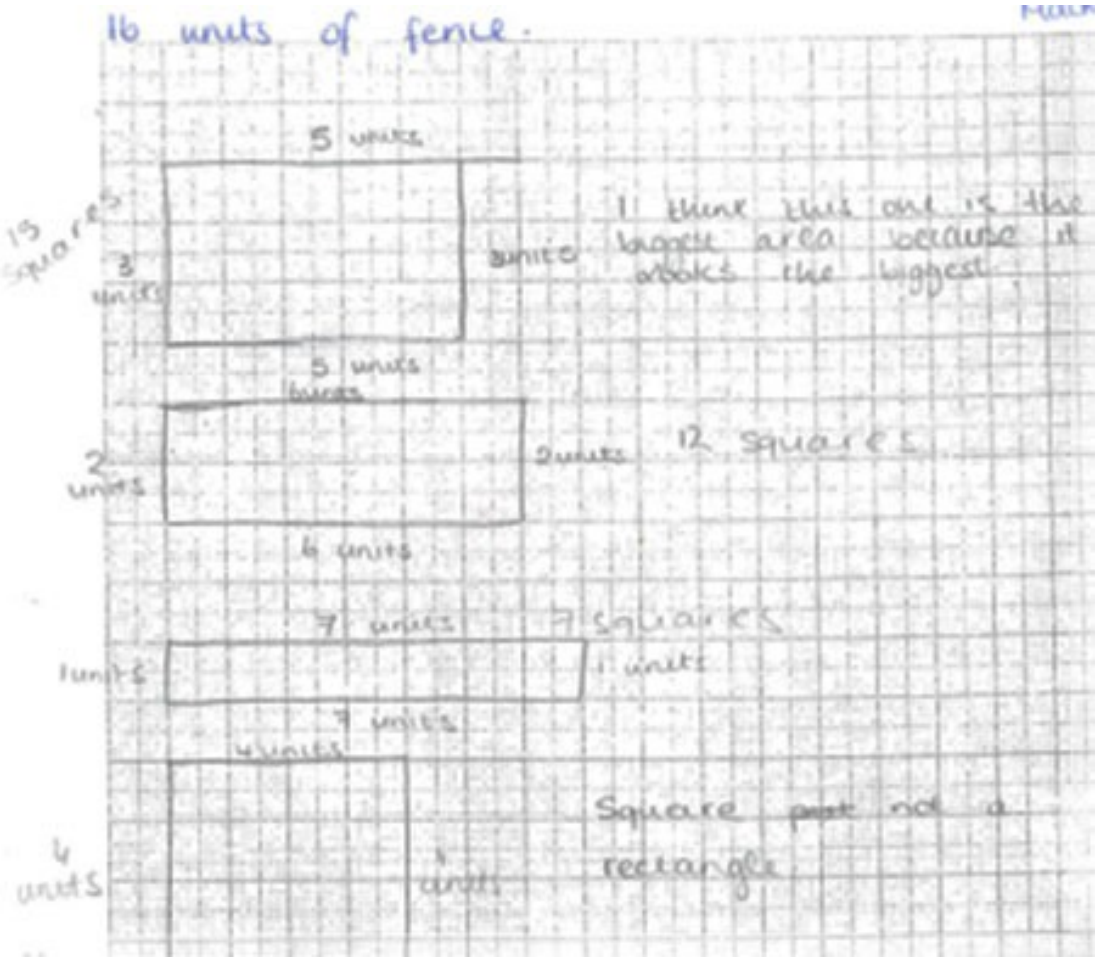
On reflection I don't think this action would get a very high "press" score. I think next time for higher "press" I would probably have materials like lollipop sticks or LEGO bricks available and say "make a paddock". Then I could have further pressed for understanding, according to what they made. "Is that a rectangle?" "How do you know?" "Why did you choose to use that representation?" "Show me the 16 units of fence." I think if I had spent the time at this stage the girls would have been able to progress more on a strategy of their own.

After a while, when there was no sign of anyone progressing with a strategy, I told them "there are four options".

What I should have done...

Again I'd say this action wouldn't get a high "press" score. Next time I probably would ask rather than tell. Something like "Can you arrange them in another way?" "Could you have a length of 6?" I would really press to make sure they fully understood what they were doing "Could you have a length of 8? "Why?" "What is the max the length could be?" "Why?" "Does the length affect the width?" "How?" "Show me?" I would also like them to come to the understanding that trying something out with numbers is a good place to start. Try it out with numbers and then look for a pattern.

SEEING HOW THE LEARNING WAS PROGRESSING..



I found two things interesting about this piece of work that I wanted to investigate further.

The statement … "I think this is the one with the biggest area because it looks the biggest." and the statement …"Square not a rectangle".

I decided that I would provide opportunities for the students to discuss their confusions on these two issues at a later date.

An example of an independent learning activity I gave around issue 2 is included at the end.

The above was typical of the work I was seeing as I circulated. I was disappointed that no-one was putting their data in a table and I tried to encourage this without telling them. The following are examples of questions I asked:

What do you notice about the length values as you go along?
What do you notice about the width values?
Could you keep track of this in an easier way?
How about a table?

Coco's horse paddock

24 units

1 + 1 + 11 + 11 = 24 units

2 + 2 + 10 + 10 = 24 units

3 + 3 + 9 + 9 = 24 units

4 + 4 + 8 + 8 = 24 units

5 + 5 + 7 + 7 = 24 units

6 + 6 + 6 + 6 = 24 units

Width	Length	Area
1	11	11 units^2
2	10	20 units^2
3	9	27 units^2
4	8	32 units^2
5	7	35 units^2
6	6	36 units^2

Find a general rule to find max area →

Area = l x w

max area = l = w

max area = l x l

*look at x off board

l = ¼ Perimeter

l = P/4

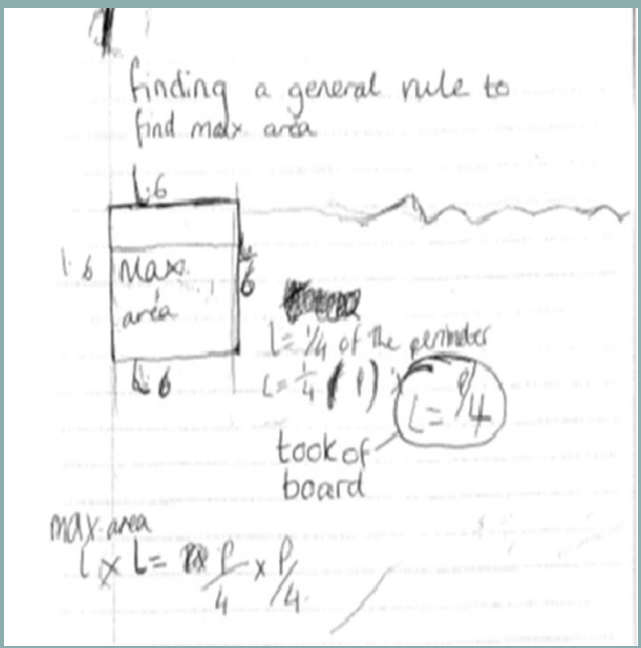
Area = l 2

FINDING THE GENERAL RULE...

When it came to finding the general rule I gave far too much help. I was worried that I was running out of class time and I just told them and some understood, some didn't. I said things like

"When it's max area, what do you notice about length and width?"

"Write down Max Area = l x l . Now try and write l in a different way. Discuss how 4 sides of a square are the same, so now write it down in terms of perimeter."



Again I know this action wouldn't get a high "press" score. Next time I'll press a lot more.

When is the area a maximum? Write this down in words

Now try to shorten this sentence by writing it in symbols

How does this relate to the perimeter?

Now can you rewrite this in terms of the perimeter.

IN SUMMARY...

I suppose the main thing I've learned from leading this activity in my class is that I need to change my behaviour in the classroom if I am going to help my students gain a better understanding of the mathematics and begin to think for themselves. I have to keep thinking about what the purpose of this activity or class or task is. It isn't really the right answer; it is about helping students make sense of maths and helping me to assess their learning. This really became clear to me when I was reflecting on this lesson. It isn't about the answer; there is so much the students can learn from it and I am going to use it again with this group when we come to look at max and min problems. I think I introduced it to the class too soon; they weren't really empowered to think about problem solving strategies like using a table, using a graph, using a formula, etc. and I really was focusing on them getting to the end with an answer, rather than on what they were learning.

For me I suppose what I've taken from this is

"Don't tell why, ..ask why"...*Press for learning* ..I like it.

But I must say I will spend some time thinking about my '*press*' questions before I do an activity again.