Self-regulated learning in the mathematics class

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Researchers: Charles Darr and Jonathan Fisher

Context: proportional reasoning (Year 7)

Two researchers taught a series of lessons on proportional reasoning to a class of Year 7 students over a 4-week period. Classroom interactions were videotaped and five students interviewed before and after the unit of work. Two instructional components were identified as promoting the kinds of attitudes and behaviours that support SRL. They were:

- using thinking models to represent proportional problems
- reflecting on learning in written journals.

Using thinking models to represent proportional relationships

Thinking models help students to form a representation of a problem situation. They can involve concrete objects, or be more abstract. Thinking models used included double number lines, geometrical shapes, cuisenaire rods, and decimal pipes.

The double number line

One of the most successful models was the double number line. The double number line allows the elements in a proportional relationship to be modelled on a two-sided scale.
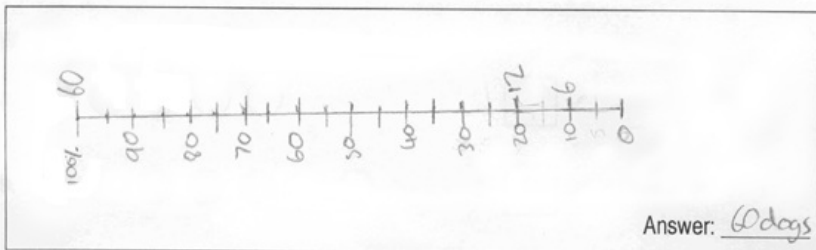
The double-number-line was introduced to students through a series of hands-on activities involving two-litre milk containers. As a thinking tool it:

- elicited thinking and supported discussion

- helped students to illustrate proportional relationships

- allowed students to concentrate on observing and controlling the problem solving situation rather than holding all the details in their minds

- helped students to become familiar with strategies that could be used to solve similar problems.
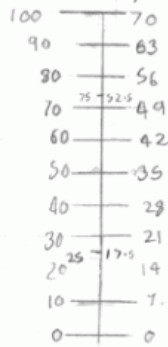
Journalling

Writing journal entries allowed students to reflect on the experiences, ideas, and feelings involved in their mathematics learning. Journalling was used on six different occasions and was often initiated with a prompt from the teacher. One example was:

"Write some instructions to a Year 5 explaining how to find two thirds of 60."

We found that using journalling:

- allowed teachers to identify emerging thinking

- began learning conversations between teachers and students

- allowed teachers to give feedback

- helped focus lesson planning

- sometimes resulted in students sharing their journal entries with others, allowing them to observe other ways of thinking and explaining concepts.

Well first draw a line with a hundred percent at the top, because that is as big as it can go, a hundred percent.

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100 ——┬—— 70
 90  ——┼—— 63
 80  ——┼—— 56
 70 75 ┤52.5 49
 60  ——┼—— 42
 50  ——┼—— 35
 40  ——┼—— 28
 30  ——┼—— 21
 20 25 ┤17.5 14
 10  ——┼—— 7
  0  ——┴—— 0
```

So now you've got to divide it by 10 to find 10% Like so.

Then divide 70 by 10 which is 7. Mark it up in sevens.

There you go.

Wow – this double number line is great! WELL DONE! Can you think of another way to find the 10%'s?

Find 50% by dividing 70 by 2 which is 35 and then divide it by 5.

Yes, this will work too. Well done. ☺

Providing opportunities for students to observe and reflect on their own thinking is critical if they are to develop the ability to self-regulate in mathematics. Integrating thinking models and reflective journalling into the normal flow of mathematics instruction can help students become aware of their own ability to organise thinking and learn mathematics.

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