Pedagogic Content Knowledge in Mathematics Education

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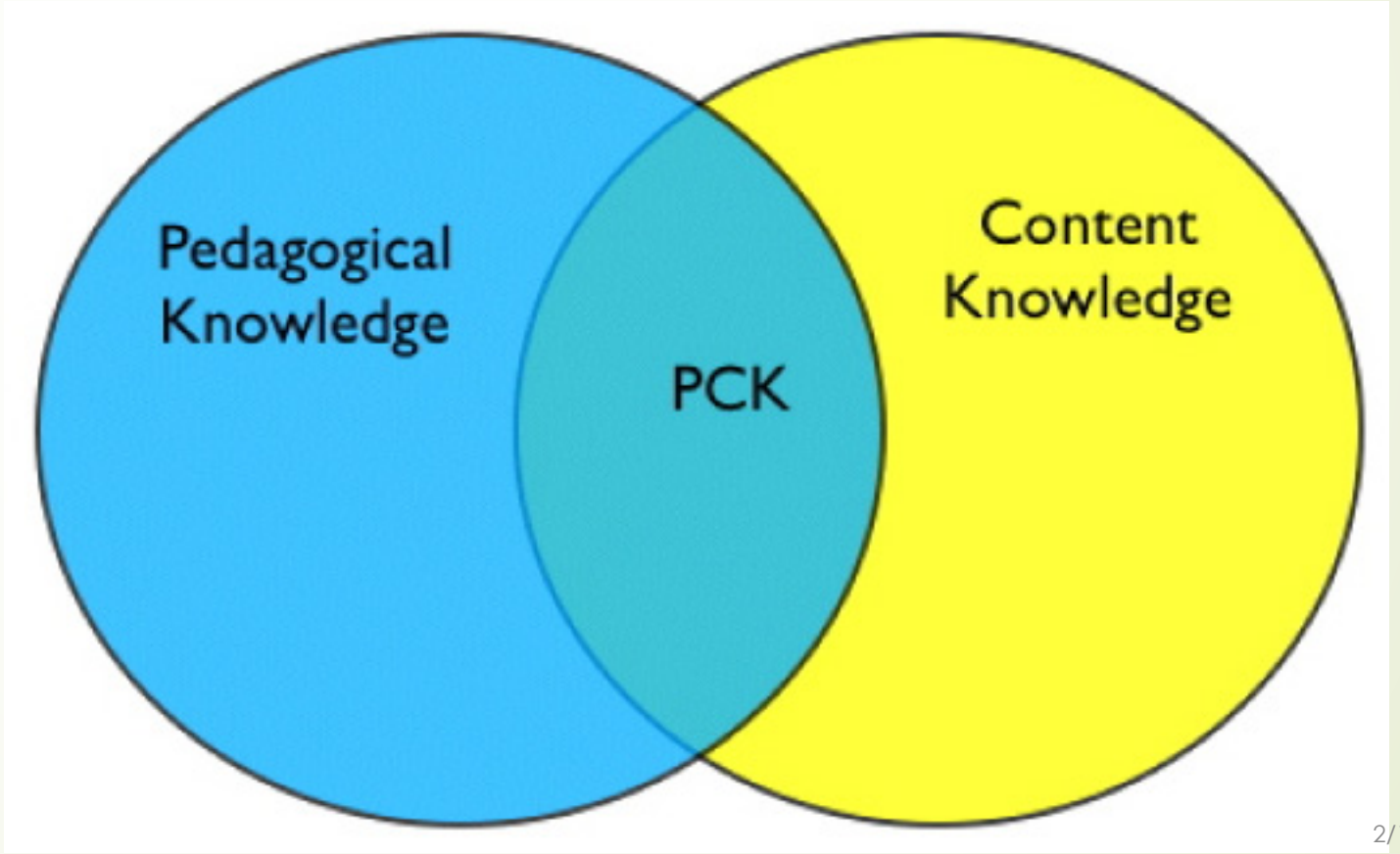
Pedagogic Content Knowledge



PCK (Schulman 1986)

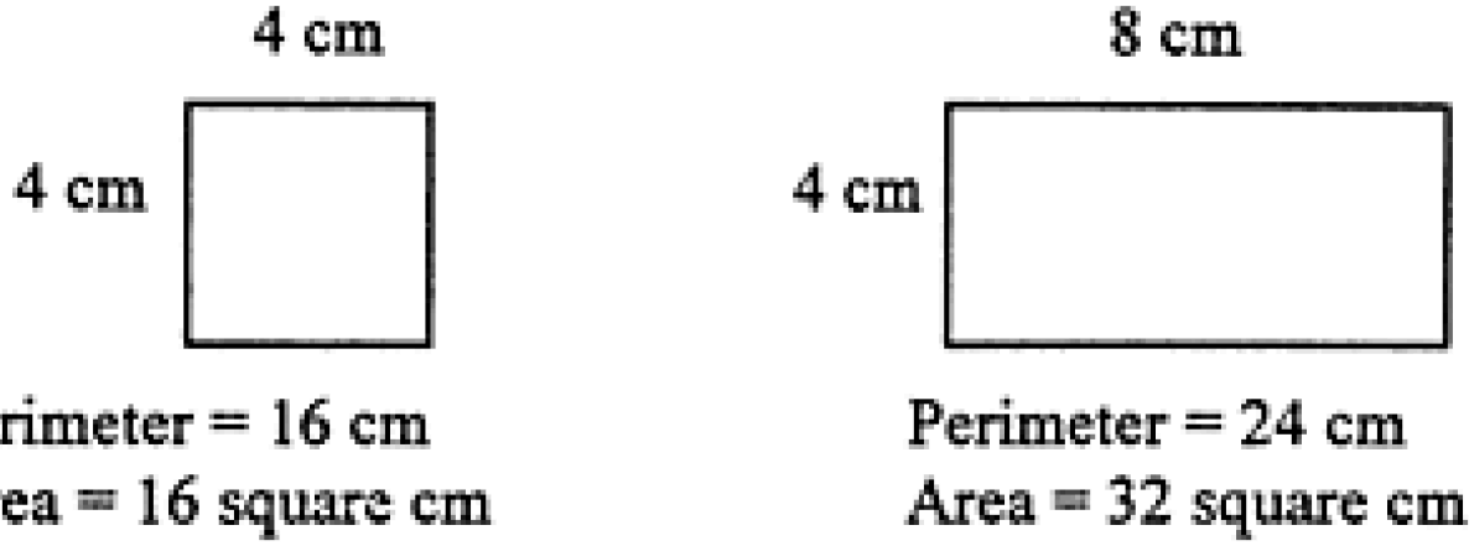
- Knowledge of subject matter for teaching
- Knowledge of useful representations (ગાણતિકિ પ્રતનિધિત્વિ)
- Powerful analogies (ગાણતિકિ સામ્યતા)
- Illustrations (ગાણતિકિ ચત્રિો)
- Examples (ગાણતિકિ ઉદાહરણો)
- Explanations (ગાણતિકિ સ્પષ્ટતા)
- And demonstrations (ગાણતિકિ દેખાવો)

Knowledge needed for representing and formulating subject matter so that it becomes comprehensible to others

Let us study a scenario from a classroom …

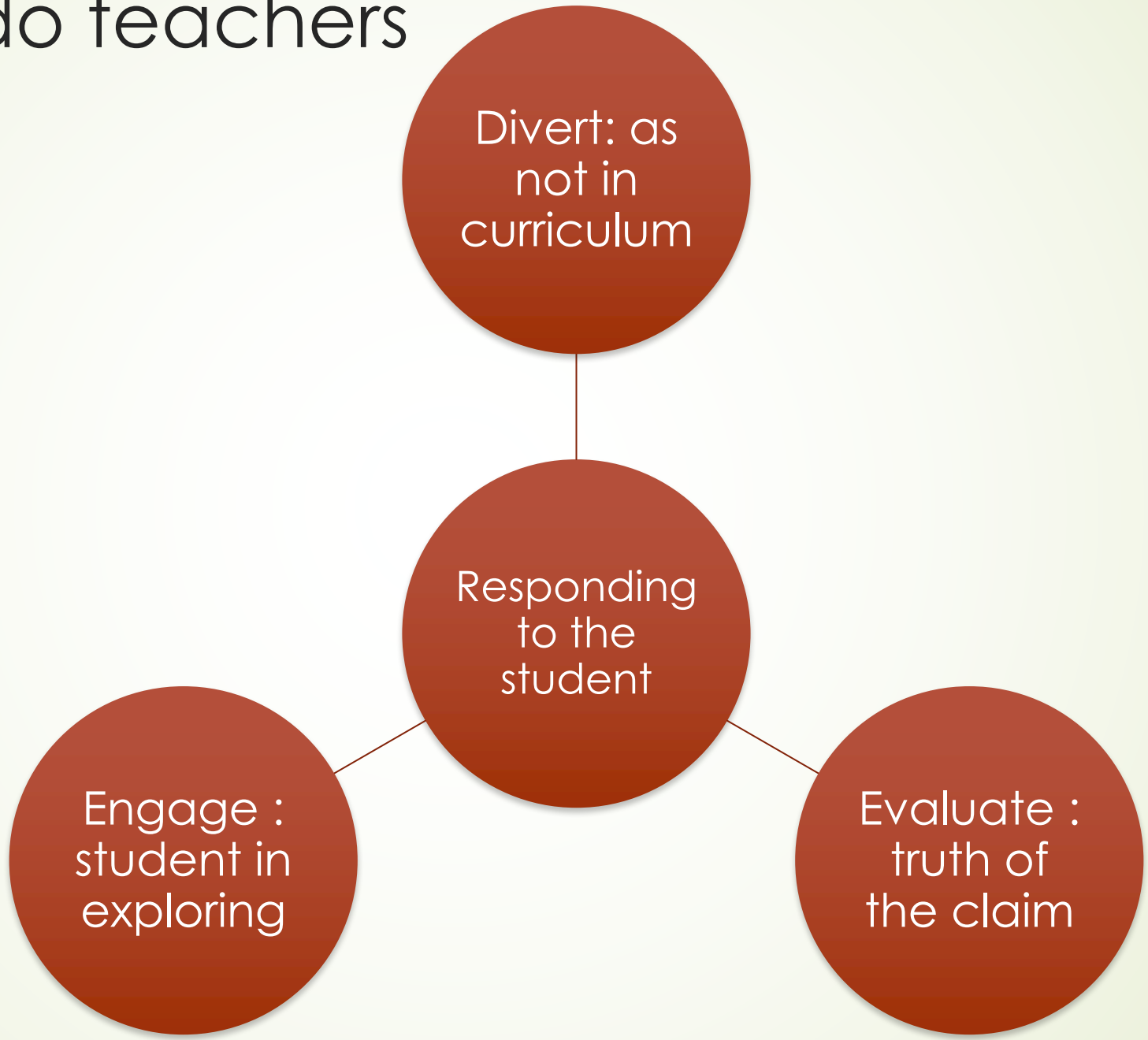
Scenario

Imagine that one of your students comes to class very excited. She tells you that she has figured out a theory that you never told the class. She explains that she has discovered that as the perimeter of a closed figure[1] increases, the area also increases. She shows you this picture to prove what she is doing:



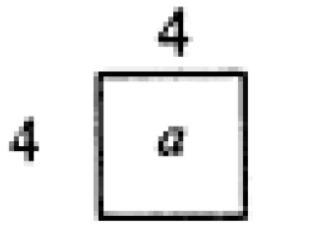
How would you respond to this student?

What do teachers do?

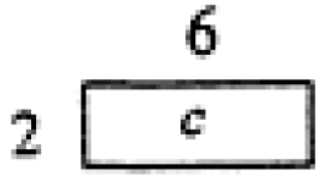


What can teachers do?

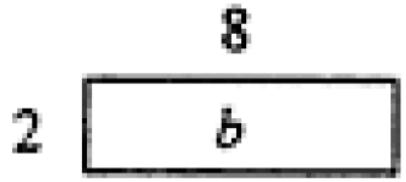
I will present several figures to her and ask her to calculate their perimeter and area:



P = 16
A = 16



P = 16
A = 12



P = 20
A = 16

P = 16
A = 7

Let us study some more scenario…

Q1] A student was asked to fill in the appropriate sign < or > or =, in the following comparison of expressions

$$59 \div 42 \quad \square \quad 359 \div 342$$

A student said he would write the "equal to" sign because

" 59 ÷ 42 = 1 Remainder 17

359 ÷ 342 = 1 Remainder 17

So in both the expressions the answer is 1 and the remainder is 17, and that is why they are equal."

How would you respond to this student?

Q. 3] Sunny gets some of his addition questions correct, but gets some of the simplest ones wrong. Here are four of the questions he did. If Sunny makes the same mistake with the fifth question below, fill in the answer you think Sunny would have got.

46	18	8	42	72
+ 3	+ 30	+ 16	+ 56	+ 5
13	48	15	98	98

Give one suggestion that might help Sunny get his questions correct.

Q. 2] A student in the class had added fractions like this, $\frac{3}{7} + \frac{2}{3} = \frac{5}{10}$.

The teacher marked the student's answer as wrong. However, the next day father of the student arrived in the school with a complaint. He pointed out that the method that his daughter followed is exactly the same as what the teacher used. He said when marks in history are $\frac{35}{50}$ and marks in Geography are $\frac{28}{50}$, then the teacher wrote total marks in Social Sciences as $\frac{63}{100}$.

How would you respond to this parent?

Q. 4] Which of the story problems given below could be used to illustrate $1\frac{1}{4} \div \frac{1}{2}$?
Make one story problem of your own for this mathematical problem.

- If $1\frac{1}{4}$ *roti* has to be divided between 2 children, then how much *roti* each of them will get?
- If you had $1\frac{1}{4}$ Rupees and your mother gave you double of that to you. How much money your mother gave it to you?
- If you are making handkerchiefs of area ½ square meter, and there is $1\frac{1}{4}$ square meters of cloth. Then how much handkerchiefs can you make?

A square of perimeter of 20 cm is cut of from a triangular piece of paper of perimter 80 cm as shown.

Triangular piece

After a square is cut off

What is the perimeter of remaining piece?

A. 60 cm B. 65 cm C. 90 cm D. 100 cm

References

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