



THEORIZING REPRESENTATIONAL KNOWLEDGE IN WNA CONTEXTS IN SOUTH AFRICA



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Broad South African context



- Low levels of learner performance seen in standardized testing, poor facilities and functionality in many schools and high inequality – in common with many developing country contexts (Pritchett & Beatty, 2012)
- Evidence of gaps in middle years teachers' SMK at, or close to, the level of teaching
- Syntactic knowledge issues across early and middle years.
- Evidence of highly cue-based mathematics teaching
- Points to urgent need to address CCK and SCK with pre- and in-service teachers

Project context



- Wits Maths Connect – primary research and development project
- Includes an in-service ‘primary maths knowledge for teaching’ course
- Attention to connecting between representations and providing explanations, as a means of supporting the development of ‘mathematical discourse in instruction’ (MDI) (Venkat & Adler, 2012; Adler & Venkat, 2014)

Theorizing knowledge of representations and explanations



- Shulman's (1986) PCK includes: “the most useful ways of representing and formulating the subject that make it comprehensible to others’ (p9)
- ‘selecting a mathematically appropriate representation’ – SCK (Ball, Thames & Phelps, 2008: 398) (part of subject matter knowledge and distinct from ‘common content knowledge’)
- CCK: ‘knowledge of a kind used in a wide variety of settings—in other words, not unique to teaching’

A whole number scaling pre- and post-test item ...

1 litre of petrol costs R10.75

Provide a method AND an explanation for working out the costs of:

a) 3 litres of petrol

	2013 pre-test	2013 post-test
Correct/39	17	31
Representation		
Symbolic	33	28
Ratio table	1	2
Double number line	2	19
Explanation	14	28

Representations and explanations as tools vs object

- Evidence of association between expansions in representation and explanatory repertoires.
- Associated for some, with moves to getting correct answers
- Associated for others, with expansions in MDI that are described as pedagogically useful

As **tools** or **objects**, representations/explanations approach with CCK type items and SCK orientation involving WNA, may point to ways of (re)learning mathematics that are helpful for teaching in developing country contexts

Data suggests ..



- Need in SA to approach WNA teacher development work with an SCK orientation (MDI with representations and explanations key within this notion)
- That a focus on MDI works simultaneously at supporting the development of teachers' CCK and SCK
- That tasks that might be worked with solely from a PCK angle in more developed contexts may well have purchase from SCK and CCK perspectives in SA.