Mathematics Knowledge in Teaching: Formulating Research

The Williams report contains notable propositions. For this seminar series it provides an opportunity for constructive response towards the implementation of some of these recommendations. From the report[1] I have taken some particularly interesting items.

1: 'Emphasis in the connections between mathematical ideas'

- Is there an agreed mapping out (in the communities of teachers, mathematicians, pedagogues) about connections within mathematics? Are there accepted cannons of connectivity in mathematics?
- If such agreements exist, are they reflected in the understanding, epistemology, of the communities of practice? What are the methods by which the community is part and made part in such agreements? (How is mathematical connectivity reflected in the professional development?)
- What is the current experience for the pupil/student of connectivity in mathematics? Is there an expectation and a conceptual preparedness to experience, say, addition, multiplication and division as closely related? Or at the level of the secondary curriculum, what is the evidence that students seek mathematics to be interlinked so that, say, tangent and derivatives are one and the same thing, or that integration and differentiation are inverse to each other?

2: 'An optimum manner in which mathematical concepts should be introduced?'

- Presumably there is no single optimum manner of introduction, and this is problematic. Nevertheless, the need for a change in the current arrangement is obvious and so this question is highly relevant. If the relative merits of various conceptual schemes are being debated, how do these find suitable translation into regulatory frameworks and teacher practice?

From the Williams Interim Report, my emphasis: 'The link between the curriculum and pedagogy is critical, and in particular the curriculum content must be presented in

[1] Interim Report of 19 March 2008

ways that **emphasise the connections between mathematical ideas**; mathematics is hierarchical, but not necessarily (in fact rarely) linear. However, one effect of the presentation used in the original frameworks was to compartmentalise the curriculum, and then to combine topics in a rather arbitrary way to construct two-week segments. This may have suited class planning, **but it in no way reflects the optimum manner in which mathematical concepts should be introduced.**'

'It must be more widely recognised that mathematics is a complex and in some respects different subject from others, and that it **cannot be arbitrarily compartmentalised**, nor can specific modules be timed precisely. There have been excellent examples of teacher consultation with children at the end of a week to plan the next stage of learning in some cases to repeat a topic, in other cases to move forward perhaps a little faster. Once again, the panel stress the obvious need for flexibility and delegated authority to place such decisions in the hands of the classroom teacher.' (Page 64)

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7 May 2007