Plenary Speech 1

The Theoretical Core of Whole Number Arithmetic

Date & Time: Wednesday 3 June 2015, 10:20-11:20
Venue E4-G078, Anthony Lau Building, University of Macau
Language: English
Speaker: Prof. Ma Liping, Carnegie Foundation for Advancement of Teaching, USA

Abstract:
There are at least two different perspectives on whole number arithmetic in primary school. In the US, the tendency is to consider it as only learning to compute the four basic operations with whole numbers. In China, however, whole number arithmetic involves much more than simply learning to carry out the computational algorithms. For example, it is expected that students explore the quantitative relationships among the four operations, and represent these (sometimes quite sophisticated) relationships with (sometimes quite complicated) numerical equations. In the speaker's opinion, this exploration of quantitative relationships is made possible by the theoretical core that underlies school arithmetic. In this talk, the speaker will present the central pieces of this theoretical core.

Plenary Speech 2

Low Numeracy: from Brain to Education

Date & Time: Saturday 6 June 2015, 09:00-10:00
Venue E4-G068, Anthony Lau Building, University of Macau
Language: English
Speaker: Prof. Brian Butterworth, University College London, UK

Abstract:
It is widely agreed that humans inherit a numerical competence, though the exact nature of this competence is disputed. I argue that it is the inherited competence with whole numbers (the 'number module') that is foundational for arithmetical development. This is clear from a longitudinal study of learners from kindergarten to Year 5. Recent research has identified a brain network that underlies our capacity for numbers and arithmetic, with whole number processing a core region of this network. A twin study shows a strong heritable component in whole number competence, its link to arithmetical development and to the brain region. These findings have implications for improving numeracy skills especially among low-attaining learners.

Plenary Speech 3

Quantities, Numbers, Number Names and the Real Number Line

Date & Time: Sunday 7 June 2015, 09:00-10:00
Venue E4-G068, Anthony Lau Building, University of Macau
Language: English
Speaker: Prof. Hyman Bass, University of Michigan, USA

Abstract:
This talk introduces an approach to developing concepts of number using general notions of quantity and their measurement. This approach, most prominently articulated by Davydov and his colleagues, offers some affordances that are discussed. Some arguments favouring this approach are offered. First is a way of providing coherent connections in the development of whole numbers and fractions. Second is that it makes the geometric number line continuum present from the start of the school curriculum as a useful mathematical object and concept into which real numbers can be eventually explicitly developed. Third, in the Davydov approach, are some opportunities for some early algebraic thinking. I also present an instructional context and approach for the development of place value as a numeration system modelled on the invention of a place value system of number representation.