Report On The BMC Splinter Sessions In Mathematical Education

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The programme of The British Mathematical Colloquium included for the first time this year two afternoon Splinter Sessions on Mathematical Education, chaired by Peter Saunders [Kings College, London]. These took place on 18 and 19 April 2000 and the following talks were presented:

- Developments in school mathematics of concern to universities
  - Tony Gardiner [Birmingham]
- Research into how our students learn mathematics: what it can tell us
  - David Tall [Warwick]
- The new Learning and Teaching Support Network for mathematics
  - Pam Bishop & Joe Kyle [LTSN/Birmingham]
- The Funmaths Roadshow of the Liverpool Mathematical Society
  - Ian Porteous [Liverpool]

Developments in school mathematics of concern to universities

In this session Tony Gardiner highlighted a number of developments which will affect the nature of pre-university mathematics. In doing so he called on academics to provide a lead in reacting to these changes for the benefit of schools, children and teachers throughout the nation. Among the topics highlighted were:

- Little or no emphasis on the common techniques for arithmetic in the early years;
- The fact that the revision of the National Curriculum at Key Stage 4 seemed to be driven by vocational needs rather than balancing these with academic requirements;
- The "Excellence in Cities" initiative which may favour acceleration at the expense of enhancement;
- The imminent demise of Further Mathematics A level. This, it was suggested, was perhaps the most serious threat to the discipline leaving single subject mathematics as simply a "tool kit with nothing to use it on".

Research into how our students learn mathematics: what it can tell us

David Tall opened his talk by welcoming and highlighting the recent decision of the AMS to include Mathematical Education in its classification scheme of mathematical research. The overall subject area lies within class "97" with, for example, 97C20 covering "Student Learning and Thinking". After a brief overview of the history of research in mathematical education, David discussed in more detail some of the research he and his colleagues had carried out, including the theory of "cognitive units" which are pieces of cognitive structure that can be held in the focus of attention together with other cognitive structure that is linked to them. In some sense they measure that amount of information that can be the focus of attention at any one time.

The talk concluded by presenting the case that suitable use of the visual imagery available in IT could be a major force in helping students understand analytic concepts such as continuity. It was argued that there was a danger of teaching proof instead of analysis and the meeting was left with the following questions: "Do all students require formal proof? Might it be reserved for those destined to be specialists in mathematics? Is generic visual proof sufficient for non-specialists?"

David Tall's research papers may be viewed at http://www.warwick.ac.uk/staff/David.Tall/

The new Learning and Teaching Support Network for Mathematics, Statistics and Operational Research

Pam Bishop opened this session by outlining the origins and purpose of the new LTSN centres. This was followed by a more detailed description of the constitution and operation of the LTSN in Mathematics, Statistics and Operational Research. Pam indicated the principal personalities and their respective roles. It was noted that the Centre had already initiated a consultation exercise among Heads of Departments of Mathematics. In addition the meeting was informed of the Centre's first workshop [in May 2000] on Computer Aided Assessment.

In the second half of this session, Joe Kyle began by indicating some of the things LTSN was not (such as ILT). He re-iterated Pam's message that LTSN exists to react to the needs of the whole of the academic community involved in teaching MSOR. Some topics had already been mooted and it seemed likely that LTSN might usefully assist institutions in areas such as the transition question, diagnosis and remedial strategies, and even in providing various glosses on the benchmarking statement when it emerges. In the ensuing discussion, it emerged that colleagues might turn to LTSN to supply something like a national database of "standard" examination questions. [Although the suggestion of LTSN setting "National Examinations" itself was thought by many (including JK) to be rather dangerous.]

The Funmaths Roadshow of the Liverpool Mathematical Society

After a short history of the development of the Funmaths Roadshow on Merseyside the meeting moved to another room to enjoy a more interactive appreciation of the tasks involved. The Roadshow consists of four boxes each of which contains 25 mathematical activities. The boxes are roughly graded as being accessible to school Years 5, 6, 7 and 8, respectively. In most visits only two of the boxes are involved, though occasionally three have been used. Pupils have their own answer sheet with boxes numbered according to the activities on display, to be initialled by helpers when activities are successfully completed. Helpers may be staff or older pupils from the school.

In a typical session of between 60 and 75 minutes most pupils will complete well over a dozen activities. The puzzles are usually laid out on tables arranged randomly in a hall. For almost all activities the only equipment required is a pencil or pen. At the end of the session pupils are asked to indicate which puzzles they have enjoyed the most and which they have found the most challenging. The Roadshows operate across the whole spectrum of schools in Merseyside and appear always to be taken seriously. Ian summed up the enterprise in the two words "enjoyment and challenge". The organisers report a high level of success in all pupils including children with special needs.

Also on display were problems that might be included in the more advanced boxes 5 & 6 suitable for use with pupils in Years 9 and 10. Those interested in the Roadshow should contact Ian Porteous at the Department of Mathematical Sciences, The University of Liverpool, Peach Street, Liverpool, L69 7ZL, tel 0151 794 4066/ 4012, email porteous@liv.ac.uk