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# A National Approach to Diagnostic Testing

Report of a meeting held in June 2001

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**Pam Bishop**  
**LTSN Maths, Stats & OR**  
**Network**

p.bishop@bham.ac.uk

**Stephen Hibberd**  
**University of**  
**Nottingham**

stephen.hibberd@  
nottingham.ac.uk

The debate over the levels of mathematical competence of students entering University courses and the balance of skills that they possess remains an ongoing and active issue with regard to pre-university student achievement and of subsequent course curriculum design. Consideration of monitoring student intake abilities and subsequent student support is a feature of many Institutions within the UK, with a variety of practices, restricted in many instances by the availability of readily useable resources. Following a request from organizations within the Mathematics Community the LTSN Maths, Stats & OR Network convened a meeting to clarify the issues and to discuss the merits, practicability and funding for creating a national support framework to provide relevant materials, dissemination of good practice and to globally monitor ongoing changes in intake capabilities in mathematics to University courses.

## *Introduction*

Representatives from the IMA, LMS, RSS and HoDoMS were invited to a meeting on 'A National Approach to Diagnostic Testing' hosted by the LTSN Maths, Stats & OR Network in June 2001, to make contributing presentations and to evaluate survey documents on existing practices in UK Universities regarding diagnostic testing and student support provisions.

A number of points were identified:

- 1 With regard to changes in A levels, evidence was presented to show that students with A and B grades have little change in performance since 1990, whereas those with D and E grades are doing much worse.
- 2 Students have a much wider diversity of experience than in the past – since A level has a core of 40% so there is a minority of common syllabus between the different Examination Boards .
- 3 Experiences with Scottish students show a similar pattern to those in England though the situation seems less acute.
- 4 An ongoing staff development problem is to provide teaching staff and examination boards with updated information on issues relating to student experiences at the School/University interface.
- 5 A variety of diagnostic tests are in use at the moment as confirmed by a confidential tabled document summarising the provision at half the departments in the UK.
- 6 A number of existing tests have been in use for some years but many are considered as outdated in not containing the more recent wider topic coverage and some are now pitched at too high a level of student expectation.
- 7 For encouraging student-centred learning the use of a diagnostic test is considered as useful to identify individual deficiencies that could be addressed. Experience suggests that at intake, gaps in student's expected background abilities are not homogeneous but in (differing) selective areas.
- 8 An important point raised was that of the difficulties of providing testing and support to larger student groups. It is recognised that increasing funding pressures has resulted in some amalgamation of mathematics departments to within larger academic entities and with a decreasing ability for direct specialised support in mathematics.
- 9 Significant numbers of students are learning their University mathematics in non-specialist departments. It is anticipated that similar, if not wider, difficulties may naturally arise from using non-specialist teachers.

### **A National approach**

Earlier initiatives to promote the use of diagnostic testing at a national level included several projects from phases 1 and 2 of the Teaching and Learning Technology Programme (TLTP), a website set up through a HoDoMS grant (but not maintained) and an unsuccessful bid under TLTP Phase 3 for Diagnosis and Mathematics Student Centred User Support (DAMASCUS). A recommendation of the report 'Measuring the Mathematics Problem' endorses the possibility of setting up a National Centre for Diagnostic Testing. This would not only enable more global information for wider dissemination but provide a focus for the development of effective practices and to promote and enable wider implementation. The case to provide a national framework to provide practical, logistical and pedagogical support for implementation of diagnostic tests and supporting materials is considered worth pursuing. Some points that arose from discussion included:

- 1 It was agreed that a national database of questions and the ability to set and sit tests online would save individual lecturers a great deal of time. However, there was discussion as to how the tensions between benefits for students and benefits for others could be managed within such a national approach.
- 2 A main emphasis should always be on supporting students - a national test would need to be flexible enough to be applicable to a local situation and would need to be managed locally to ensure that students benefit from the exercise.
- 3 The difficulty of finding teaching time during a first year timetable for follow-up work to be done was recognised. A national suite of diagnostic tests at suitable levels would be useful in selecting students who really need additional help and identifying the resources needed on an individual basis.
- 4 A universal test for all maths students was not considered desirable. However, a national approach might include a number of 'standard' graded tests, perhaps available by download from a website.
- 5 A national database of questions could be used to assist the construction of more individual tests either for diagnostic or progression purposes (eg as used in the Test and Learn initiative at Bristol)
- 6 The quality of a test will be important - this is limited by the types of questions available, and also by the technology of delivery. Some users may prefer the use of multiple choice questions (MCQs), perhaps computer marked, whilst others

may prefer more involved questions that require human markers. Experience and methods of efficiencies in these areas can be readily shared within a national framework.

- 7 The ready availability of proven testing and support materials would encourage more Institutions to invest in a formal provision to help integrate students into University mathematics courses depending on their intake capabilities.
- 8 In any provision, confidentiality of student results to the institution will be important, even if a range of tests is available for delivery and marking over the Web.
- 9 Extensions to the provision could include the development of diagnostic tests that could be sent to students before the start of their studies and complemented by appropriate support packages prior to starting their course. However, it is recognised that often weaker students are the last to secure places.
- 10 A National Centre would provide the capability for the collection of national data either on the basis of 'standard tests' or on the basis of individual questions. This could provide a source of independent and statistically valid information - particularly if responses could be logged along with each student's prior qualification in mathematics.

### **Funding**

A number of promising areas for seeking funding were identified:

- 1 The Fund for the Development of Teaching and Learning (FDTL) may provide a timely source of funding.
- 2 The Gatsby Foundation sponsored a two-day Seminar that led to the Report *Measuring the Mathematics problem* and an approach for funding could be made as proposals will include issues of access.
- 3 Support funding may be sought from the DfES and research councils. Publishers entering the field of assessment (including e-grading) would also have an interest, and there might be other commercial partners.

### **Strategy**

It was generally agreed that there should be a national centre in some form. This could be managed by the LTSN Maths, Stats & OR Network, although the expertise will lie elsewhere. Interoperability standards are emerging for questions and testing, and there should not

be different factions round the country - all those concerned with mathematics teaching should feel they are involved.

Continuation of the present working group was considered as the best way of making progress and keeping everyone involved. Additional nominations might be invited from academically focussed groups such as Committees of Professors, the Royal Academy of Engineers, the Edinburgh Mathematical Society, and possibly those involved in A level testing.

If appropriate, members of the working group would form a management group for the resulting national centre. An action plan must concentrate on identifying funding opportunities and writing funding applications; in the first instance a bid to FDTL4 is identified as a priority and an outline schedule is provided.

A report of the meeting would be published in the LTSN newsletter *MSOR Connections* and would also go to the next meetings of the education committees of the IMA, LMS and RSS, and to the HoDoMS committee. Comments received would be evaluated at a future working group meeting.

### FDTL4 Bid

Resulting from the previous round of QAA subject assessments, the HEFCE are inviting bids for subject-specific projects. Invitations to tender are expected in the autumn, and MSOR departments with QAA combined scores over 21 in the AQE in England and Northern Ireland will be eligible to apply for up to £180,000 over three years (£250,000 for a consortium).

The earlier DAMASCUS proposal could readily provide the basis for a funding bid. The proposal needs to be broadened and circulated to potential partners for a more general application regarding a national diagnostic centre for the whole of the UK. A proposed schedule is:


- the DAMASCUS bid to be circulated as a possible basis for a funding bid
- partners to identify themselves to one another as a bidding consortium
- action a subgroup to write the first draft of a bid (by FDTL3 guidelines in the first instance) and to seek statements of support from national bodies (see 4 above)
- amend this draft in the light of FDTL4 guidelines (due to be published in mid October)
- attend FDTL4 briefing meeting on 28 November

## New Events Diary

A new events diary has been launched on our website. The address is [www.ltsn.gla.ac.uk/events\\_diary](http://www.ltsn.gla.ac.uk/events_diary)

The page gives a list of forthcoming events and gives website links and contact e-mails where appropriate. The diary may be searched in three different ways;

- using a calendar month view. By default this shows the current month. It has 'previous month' and 'next month' links.
- keyword search. The event name and description can be searched for keywords.
- clickable regional map. Clicking on a region lists all the events for that region. Click on the map again to return to all regions.



**Events Diary**

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