Evaluating Mathematics Pathways Project
www.nottingham.ac.uk/emp

End of Year Report - Executive Summary

Stage 4
May - December 2008

Executive Summary

This end of year report is the third report from the Evaluating Mathematics Project (EMP) and arises from the evaluation activity of the EMP team during Stage 4: May to November 2008. All of the objectives of the Stage 4 plan have been met.

Since our Stage 3 report considerable shifts have taken place on the pathways landscape. Several of our recommendations in that report related to the GCSE hurdle and *additional* mathematics GCSE. Although a great deal of discussion has taken place around these issues, and the consultation on the GCSE criteria was completed in September, the outcome of those discussions/consultations is still awaited. In addition, there is ongoing discussion of a range of issues around GCE mathematics[1], some of which were raised in the GCE participation report (Matthews & Pepper, 2007). Consequently discussions about GCE are at various stages of development and decisions on these matters are yet to be finalised.

The work of the Evaluating Mathematics Pathways project has continued apace since May. We have now visited nearly one hundred pilot centres, several on more than one occasion, across the various pathway qualifications. During the early part of the Stage these visits were largely to centres piloting GCSE qualifications and functional mathematics. More recently we have added to these a number of post-16 centres piloting FSMQs at Levels 1 to 3, GCSE, AS and A2 Use of Mathematics (UoM) and GCE mathematics and further mathematics. We have undertaken a comprehensive analysis of the data collected in the academic year 2007-8, including further survey responses (a partial presentation of which was included in the Stage 3 report). Following on from the scrutiny work started in the previous Stage report, we have continued to look at AS level qualifications and FSMQs. A particular aim has been to explore continuity and progression across the 14-19 age range. We have attended and/or presented to meetings of a wide range of stakeholder groups. Summaries of these various strands of work can be found in the Appendices.

Combining these rich but complex data is a challenging process and the EMP team has spent considerable time analysing the range of data in order to draw robust conclusions and highlight emerging issues. Many such issues can be found in the body of the report but here we summarise the main ones.

1. We continue to be concerned about the general lack of attention to the guiding concept of **pathways** in steering developments. Our scrutiny work highlights the experiential discontinuity between GCSE and GCE mathematics (mainly in level of algebraic demand). Given that the 14-19 landscape is changing so quickly *it would be instructive to rethink the pathway models to reflect a) the current position and b) possible future scenarios.*
2. The impact of the Level 2 functional mathematics qualification acting as a **hurdle** to obtaining higher level GCSE grades (A*-C) remains unclear. Current models from awarding bodies show substantial variation and time is running short for understanding and addressing this issue. This is exacerbated by the fact that development of the functional mathematics qualifications is iterative and ongoing. *Urgent consideration should be given to developing a strategy for ensuring comparability of expectations across awarding bodies.*

[1] These include the separation of GCE mathematics and further mathematics into discrete awards with separate criteria and AS/A having a greater emphasis on problem solving, modelling and mathematical communication

3. **Functional mathematics** is seen by teachers as being more suited to particular groups of students (i.e. lower attainers). For many low attainers it is having some impact upon teaching and learning, thereby increasing motivation and engagement. Most high attaining students will complete it as soon as possible to 'get it out of the way'. For these students, we anticipate the separation of mathematics and functional mathematics. We also expect high uptake early in 2010-2011 as centres make the most of repeated entry rules to reduce any potentially negative effect of the hurdle.

4. There is clear and growing evidence that the **removal of KS3 tests** will lead to a large proportion of schools starting their GCSE course early and completing it early (either in year 10 or part way through year 11). This could disrupt pathways at the end of compulsory schooling and we anticipate that the fallout from large scale acceleration could be very negative for learners. *QCA and others should consider carefully what the unintended consequences of this sudden change might be for mathematics and how this might be ameliorated.*

5. The future of ***additional*** **mathematics** GCSE remains unclear but we can be sure that it cannot exist in the current form. It is unfortunate that decisions have to be made at this stage in the pilot process as the iterative development of qualifications at Levels 2 and 3 might show us how such qualifications could be combined to create better continuity for learners. *Future development of a second GCSE should be predicated upon a clear and agreed understanding of aims and audience, and upon whether these aims are best met through such a qualification.*

6. The hope that new qualifications will transform **teaching and learning** in the 14-19 age range is hindered by the current educational climate. Managerialism, school markets and performativity are compelling forces which constrain the actions of teachers and departments. In a minority of pilot schools, teachers are really making the most of the opportunities afforded by functional mathematics and *additional* mathematics but these are the exception rather than the rule; most teachers remain very conservative in their practice (though not always in their beliefs). Functional mathematics is likely to be limited by this climate so that student *functionality* is a measure of passing the test rather than in being mathematically functional.

7. The introduction of **two-tier GCSE** does appear to have had some negative effects on learners. Despite the national grade profile showing little change from 2007 to 2008, many centres are unhappy with the impact of the new structure. There are early reports that the new higher tier has resulted in reduced algebraic fluency of current AS students. Although we cannot present conclusive data on this matter at this time, this is a serious issue and is worthy of further exploration. Another issue might be for centres running UoM. In the past students were accepted for UoM with an Intermediate tier grade C. However, it is unlikely that Foundation tier grade C students will be similarly equipped to deal with UoM: both grade Cs will not be considered equal.

8. Pilot **assessment items** across the range of pathways still tend to be very structured and although they have become less structured in the first cycles of the process of qualification development there is still some way to go. We have seen that sudden changes can lead to adverse reactions from pilot centres and it is apparent that many centres now consider there to be little incentive for continuing with the GCSE 1 pilot.

9. There is compelling evidence that **GCE UoM** would attract new students to study mathematics at level 3. There are some concerns amongst stakeholders about this qualification and careful consideration of the issues is needed. The small number of centres piloting the new A2 UoM are excited about its potential and have conceptualised its relationship to the traditional A level routes in different ways. Despite the potential of the course to both increase and widen participation in level 3 mathematics, the current uptake is relatively small. *It would be helpful to know whether a wider range of centres (both pilot and non-pilot) would offer this course if it became a full A level qualification.*

10. On the whole, changes to **GCE mathematics** have not been substantial. The two awarding bodies are piloting quite different models and before these have been evaluated there are discussions under way regarding future changes. *There is a need to step back from these discussions, to learn from the process of the pathways project to date (and curriculum changes in recent years), to ensure that any further developments are well designed and subject to a thorough risk assessment.*