



Evaluating Mathematics Pathways

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End of Year Report – Executive Summary

May - December 2009

Stage 6

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Stage 6 Report - Executive Summary

This report covers the period from May to December of 2009 and is the sixth stage report from the Evaluating Mathematics Pathways project. Although this stage has not included any dramatic change of direction for the Pathways project the evolutionary change of GCSE, the ongoing discussion around the future direction for A level mathematics and consideration about the place of Use of Mathematics in the curriculum are all interesting developments that we report on in the body of the report.

The Pathways project makes plain how the big political decisions and wider policy contexts of schools have a powerful impact on how piloted qualifications develop and take shape in practice. In view of this we are increasingly concerned about how changes at GCSE (two tier and changes in the DCSF's performance measure) might have a more significant impact on the quality of mathematics learning than any of the piloted qualifications.

Our research findings have shown that the inclusion of mathematics in the 5 A*-C GCSE count in the headline performance measure for schools has resulted in a substantial proportion (about one-quarter) of surveyed schools entering students early for GCSE Mathematics in 2009. There are indications that schools in which post-16 education is not possible are adopting this strategy more vigorously than those where continuation beyond age 16 is possible and the removal of Key Stage 3 tests is seen by some schools to facilitate early entry. Furthermore, students who achieve their goal at GCSE before the end of year 11 tend to follow very disparate routes, in different schools, in relation to their continuing study of mathematics. The implications for mathematics pathways are considerable with a very real risk that the improvements made to GCSE in the pilots and the rising trend of A level recruitment and retention could be undone by this practice.

The introduction of two-tier GCSE has changed students' curriculum experience in mathematics with fewer being entered at Higher tier in 2009 in the light of experiences and results from 2008. Teachers indicate that they are differentiating the Higher tier curriculum for different students and report that the highest attaining students are spending less time learning algebra than previously. The intended goal that a two tier system will increase motivation for low attainers in mathematics also seems to be very far from what is actually happening.

In this context of broader shifts in the assessment landscape, this report highlights the gradual evolutionary change at GCSE, particularly in the *additional* mathematics GCSE. There remains considerable room for improving the type of GCSE assessment items which are being provided in mathematics. This is a major issue in relation to the process of developing new qualifications, especially from our evaluation data in the context of the Use of Mathematics qualification. This in turn we think leads to an argument that more attention should be paid to training mathematics question setters to become more creative than they are at present.

The future of the Use of Mathematics qualifications at all levels is far from decided and we urge that careful consideration be given to existing research data in the decision making process. Moreover, where evidence is lacking (e.g. the impact of A level Use of Mathematics in the HE application process) we suggest further data be collected to inform the debate. This would help decision makers to make judgments informed by evidence rather than speculation and conjecture.

The full report explores all of these issues in much greater depth and from these the following recommendations arise.

Recommendation 1:

The Awarding Bodies should, with QCDA's support, explore what can be learned from the development of assessment items in the pilot. In particular the *additional* mathematics GCSE papers appear to have allowed the development of some assessment items that require students to engage with a greater range of process skills than is the case in other current qualifications, and in some instances in

contextual situations. These items may prove useful in informing principles for future assessment item writing.

Recommendation 2:

QCDA and the Awarding Bodies should consider how evidence might be collected to evaluate the impact of assessment changes upon student performance and teacher pedagogy. If this is not readily available at this point its collection should be considered for future examination cycles.

Recommendation 3:

QCDA and other bodies should further highlight the disadvantages of what seems to be an increasing practice of early entry for GCSE. We recognise that this trend might be difficult to reverse given the pressure on schools to maximise grade C performance to protect 'league table' position or satisfy Ofsted or others. The Scottish experience on this matter of early presentation would be worthy of consideration.

Recommendation 4:

Work needs to be done to determine whether the early entry patterns at GCSE reported in pilot schools are mirrored across England so that policy makers can be fully informed when deciding whether or not to take action.

Recommendation 5:

Further and larger surveys of entry trends at GCSE should be conducted (by the EMP team) with a view to understanding what the implications are for continuity and progression in mathematics learning.

Recommendation 6:

Current and future developments of GCSE and other level 1 and 2 mathematics programmes should take into account the needs of the lowest attainers who appear to be no less disenfranchised under a two-tier regime than they were in a three-tier system of GCSE mathematics. Efforts to address this should be given equal priority with constructing qualifications and pathways for the highest attaining students.

Recommendation 7:

Policies need to be clarified in relation to whether a level 1/2 certificate (in Use of Mathematics) is equivalent to GCSE as an indicator of mathematical potential for future study/employment. If this is agreed then an effective communication strategy should be developed to inform the public about the status of this qualification. If, on the other hand there is not the political will to condone this equivalence then it should be made clear at the earliest opportunity.

Recommendation 8:

All Year 13 Use of Mathematics candidates should be surveyed during 2010 to explore future aspirations, university entrance experiences, etc. This evidence is urgently needed to inform the debate about the future of Use of Mathematics.

Recommendation 9:

A national strategy for the professional development of mathematics assessment writers should be considered. This is a problem that should be tackled by QCDA/Ofqual rather than at Awarding Body Level, and is of particular importance in ensuring that qualifications can evolve to support desired curriculum and pedagogic change in addition to supporting innovation in new qualifications (such as Use of Mathematics).