



Notes on Structural Issues Facing the Two-tier Model for GCSE Mathematics February 2010

Introduction

At the ACME meeting on 4 February 2010, there was a request from DCSF colleagues for a short paper on the structural issues facing the current two-tier model for GCSE Mathematics. This paper has been written with the help of the current ACME committee and has drawn heavily on expertise in our Outer Circle. It builds on the dialogue between ACME and DCSF which has been ongoing since summer 2009, and is parallel to the debate on early and multiple entry at GCSE¹, which is also currently exercising many stakeholders.

Why two tiers?

Mathematics is different from any other general subject in that differentiation between candidates in assessment depends very strongly on setting appropriate, yet different, tasks for different candidates. This differentiation by task is so important that, in an ideal world, GCSE Mathematics would require many more than two different tiers of entry. However, the practical constraints of the real world require a sensible trade-off between precision and manageability.

The two-tier model was the response to perceived failings in the three-tier model previously used. The three most significant were:

- No grade C was available to foundation tier candidates;
- There were two very different routes to grades C and B;
- Grade C on the higher tier was often awarded for a very low percentage mark.

However, the three-tier model had the advantage that its tiers were not too broad, each offering only four grades (Higher Tier: grades A*ABC, Intermediate Tier: grades BCDE, Foundation Tier: grades DEFG). An immediate disadvantage of a two-tier model would be the need for each tier to offer five grades, which would make it possible that grades on the higher tier would be awarded for an even lower percentage mark.

Different Approaches to Two-Tier

*Making Mathematics Count*² recommended the move from a three-tier model for GCSE Mathematics to a two-tier model. Looking for a possible two-tier model to replace the three-tier model, the QCA mathematics team devised an approach that appeared to meet all the requirements for overcoming the perceived problems with the three tier model. This model involved three separate papers, one addressing grades G, F and E, another addressing grades D and C, and a third addressing grades B, A and A*. Candidates would be required to take papers 1 and 2 or papers 2 and 3. This meant all candidates would take paper 2, the paper addressing grades D and C. It was piloted to ensure no unexpected difficulties arose.

¹ The extent to which the phenomenon of two-tier and early/multiple entry are related is unclear.

² The Report of Professor Adrian Smith's Inquiry into Post-14 Mathematics Education (February 2004)

However, some of the awarding organisations objected to one aspect of the new model. This was the way in which the final grade was awarded. In conventional examinations all the marks are added together and grade boundaries are identified at points in the range of total marks. In the proposed two-tier model, however, it was essential to award grades on each paper separately. This meant for example that paper 1 could lead to grades G, F and E (and U) only. So a candidate for the foundation tier, taking papers 1 and 2, would be 'awarded' two grades – the final grade awarded being the higher of these two grades. The objection to this approach was that it would essentially discard about half of the assessment information at the awarding stage. This criticism seems reasonable as ideally all of it should count towards the final result. Yet it is based on a false premise. It is not necessary to discard half the information. Candidates should not have been awarded a grade from the higher of the two papers sat unless they had achieved the highest possible grade on the lower of the two papers. This approach does not seem to have been considered.

The current two-tier model was hastily trialled for one year alongside the model described above. Some have claimed that the methodology of these trials was inherently unsound, but, nevertheless, a substantial re-evaluation then took place and concluded that the current model should be preferred. A significant part of that decision was the fact that candidates preferred the current model – which may not have been a surprise, given that they generally found the papers to be easier.

What are the problems with the current model?

First, the current model plainly does allow grade C on the foundation tier. However, the current model retains the situation where there are very different routes to some grades, including the critically important grade C. Thus there remain significant issues for users in interpreting what is meant when someone says they have grade C in GCSE Mathematics.

Secondly, the current model has not properly addressed the question of grade C on the higher tier being awarded for a very low percentage mark. It is true that grade C is no longer the lowest available grade from the tier. However, with five grades being addressed, it is clear the boundary for the lowest grade is likely to be lower than that for the lowest of four. It is important to note that grade E is actually awarded to higher tier candidates in some circumstances, which is still less reasonable.

What is more, in seeking to reduce the impact of the low percentage boundary marks, the approach taken has been to reduce the amount of examination material addressing the top grades, in particular algebraic and geometrical understanding and reasoning. Clearly this has significantly reduced the extent to which GCSE is good preparation for A-Level, and has unhelpfully introduced a gap between the two qualifications.

This is consistent with complaints that ACME has received from teachers that students, particularly those with GCSE grades A and B, are no longer as well prepared to start AS Level as they were previously. This has enormous negative implications for the 80,000 target for A-Level Mathematics by 2014. ACME believes that this is a direct consequence of the two-tier model that was selected and calls on the DCSF to review that decision.

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