

The reformed A-levels

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Background

In response to widespread disillusionment of the status of A-levels (the annual media frenzy regarding grade inflation) the then Minister, Michael Gove, engaged with HE (circa 2012/2013). He requested the Russell Group convene A-level Content Advisory boards in certain key “enabling” subjects: Mathematics, Modern Languages and Geography.

- An overview report on the state of all A-level’s content by subject (Chemistry, Physics, English etc etc) by Mark Smith (VC of L’boro) July 2013
- The Russell Group invited to set up the content advisory boards (ALCAB) to advise Ofqual and the awarding organisations. Overseen by Nigel Thrift VC Warwick. Process started Oct 2013 with delivery July 2014 and first teaching Sept 2017.
- The Maths ALCAB was kept on by the learned societies of Mathematics to provide continuity and further advice and is now a contact group for ACME.
- Despite ALCAB (Maths) being initially a Russell Group entity the membership of the panel was deliberately chosen to be broadly based and involved teachers, educationalists, academics from outside the Russell Group, the author of previous major reports etc etc
- Members of the panel sought input from teachers, teaching conferences, learned societies outside Mathematics, the Engineering Professors council, HoDs of several Economics Depts, Operations research and many others.

Overview of the examination “landscape”

- For the uninitiated an overview of what Ofqual is (and is not), the multiple Awarding Organisations and issues.
- On the positive side there are 700 -800K 18 year olds in the UK and the most popular A-Level is now in Mathematics with 88K taking it (FM has 13K) up from 50K (5K) in 2012. This year being the first when Maths has been top (2nd is English). 90% of students doing A-level Mathematics do not do a Mathematics degree. (2015 numbers)
- You are roughly twice as likely to take A-level Maths in the independent sector as in the state sector (and 3 times as likely for FM). A-level Mathematics is perceived as 'hard' - roughly 65% of students with B at GCSE fail Maths AS.
- There is a shortfall of roughly 2.5K Mathematics teachers in the UK. Anecdotally, many good teachers want to teach Mathematics well but lack the relevant Mathematics background and thus confidence. A clear need to uplift skills.
- Crucial support is provided by a charity MEI running the Further Mathematics Support Programme - it does an incredible job trying to fill the gaps.

- The system has structural issues with having multiple Awarding Organisations, each competing for market-share; this has arguably led to a gradual descent to the lowest common denominator. The A^* is sometimes seen as being an award for speed and accuracy rather than Mathematical skill. The range of Awarding Organisations and range of modules (each examined 6 monthly and each retakable) had led to, in theory, multiple routes to getting the A-level.
- This view is widespread. Advisory Committee on Mathematics Education (ACME): "ACME believes that relatively little reform of the A level content is required, but that there should be improved quality of assessment with changes made incrementally over time. This is hard to achieve with the current regulatory structure and when there are competing awarding organisations."
- Recurring issues with quality of marking, students requesting remarking of scripts and the GCSE problems reported in the media last year/ annually.
- Several Universities, Imperial, Oxford, Cambridge, Durham, UCL and Warwick (and others) now use additional entrance examinations or tests for admission (MAT or STEP). IB has become increasingly well-regarded as it is stable and well regulated.
- A key issue is the funding of a fourth A-level, such as Further Mathematics. The DfE has recently introduced an uplift (basically 600 pounds per pupil) to try and protect post-16 mathematics provision. So it is possible to influence policy decisions as a community by constructive discussion.

ALCAB recommendations <http://alcab.org.uk/reports/>

- Strictly speaking we could only recommend content, but we sent a side-letter to the Minister too (this flagged up problems and the need for CPD- and time ..)
- A single prescribed content for A-level Mathematics for all Awarding Organisations. Removal of content perceived as easy or inappropriately placed (Decision Mathematics has gone). So universities should receive students who have all had the same content (in single A-level) despite the different boards.
- 50% of FM content similarly prescribed. The remainder free for the boards to decide - argument being that a student may wish to have more Stats or more Mechanics. Although this is reliant upon a school being able to offer such choice.
- A modernised Statistics content involving use of a large data set. This is a major change and is aimed at moving towards understanding/ context rather than rote learning.
- An aim that “problem solving” permeate the syllabus and assessment - for instance this could sometimes be simply removing scaffolding from examination questions. “we are suggesting a change in emphasis within the single A level in mathematics towards problem solving, interpretation and testing understanding. This should drive assessment with less structured questions that test understanding and help to develop strategies for solving problems either in a purely mathematical or in an applications context.”
- Not a recommendation: A rethink of assessment and a redirection away from 6 monthly examinations. Longer examinations that allow for more searching questions. Indeed the final examinations are at the end of two years.

Lessons from History

It has never been easy to teach Mathematics at school-level (or university for that matter).

There are issues with teacher retention, training and skills

In arithmetic, I regret to say worse results than ever before have been obtained - this is partly attributable, no doubt, to my having framed my sums as to require rather more intelligence than before; the failures are almost invariably traceable to radically imperfect teaching

The failures in arithmetic are mainly due to the scarcity of good teachers of it.

HM Inspectors 1876 - Plus ca change!

One issue HoDoMS could discuss is how can we, the Universities, help in this?

Run CPD/ training modules nationally that come together to give a teacher Masters in Education?

Make PGCE a core part of Mathematics degrees: Instead of summer internships in finance there could be the opportunity of teacher training each Summer plus final year modules leading to the student coming out with a Math degree plus teaching qualification. Build a pool of Math teachers for the future?