Towards Level 3 Mathematics in 2016: MEI response to ACME discussion paper

The opportunity which ACME's paper provides for informed thinking and discussion about Level 3 Mathematics in advance of the 2013 review of qualifications is both welcome and necessary. We share the hope that a wide variety of stakeholders will take this opportunity to contribute to and listen to the ensuing debate.

The ACME paper rightly acknowledges that there is a resistance to change; however, it should be recognised that well-considered and well-managed change, which benefits the education of students, is to be welcomed. Although comparability between old and new qualifications and structures needs to be clear for the benefit of end users, this is the right time to consider whether to continue with the current GCSE and A Level qualifications or to replace them.

The remainder of this response looks in detail at some of the questions raised by the ACME paper.

Should mathematics be compulsory for all learners post 16?

Students at age 16 do not always realise how mathematics will be used in their future work and studies and those who "drop" mathematics at age 16 will find that some doors are closed to them or, at least, more difficult to go through. This is recognised in many other countries where all students study mathematics until age 18.

The ACME paper raises the question of whether study of mathematics post 16 should simply be encouraged or whether it should be made compulsory.

Encouraging the study of mathematics post 16 is good but there is a risk that students will ignore this encouragement, or that schools and colleges which are short of suitable staff and resources will be unable to provide appropriate courses for their students.

Making mathematics compulsory for all students post-16 risks provoking resentment from learners who will not see the point of what they are doing, especially if courses are unsuitable, inadequately resourced or taught by unsatisfactory teachers. It is, therefore, vital that the courses which are available for students are suitable for their needs and that they are adequately resourced and taught by appropriately qualified teaching staff.

The Advanced Diploma, outlined in the ACME paper, gives a possible way forward for implementing compulsory study of mathematics for all students working at Level 3. However, it does not address the needs of post-16 students working at Level 1 or 2. From 2015, all students will be required to continue in education or training until age 18 so there will be a greater proportion of post-16 students requiring appropriate provision at level 1 or 2 than there is at present.

Age of transfer between institutions

The ACME paper puts forward the idea of transfer between institutions at age 9 then age 14 so that students would be in one institution age 5-9 then another age 9-14 then, finally, one for age 14-19. This is similar to the First, Middle, Upper School system which was first allowed by the 1964 Education Act. The maximum number of Middle Schools in England was 1413 in 1982[1]. However, this structure did not fit well with the National Curriculum key stages introduced in 1988. The number of middle schools has reduced in recent years; the reasons for this need to be understood before seeking to increase their number.

In 2008, 24.1% of 16-18 year olds were in schools, with 44.7% in colleges[2]. A move to universal transfer at 14 would have considerable implications for new buildings and structures. Consequently, such a move would need to be gradual. It would also need to fit with the proposed curriculum.

Compulsory Key Stage 2 testing encourages first transfer at age 11, ensuring that the school which is accountable for the KS2 results has had the responsibility of educating the children throughout KS2.

GCSE at age 16 encourages transfer before age 14, to allow students to settle into a new school before choosing GCSE options. For mathematics, KS3 lays necessary foundations for subsequent GCSE study. If high stakes assessment at age 16 continues, there will be a reluctance to move to a system where the school that lays the foundations is not accountable for the final GCSE results. The ACME paper notes that a change to single institutions from 14 to 19 would lead to a re-assessment of the purposes and nature of public examinations at age 16. However, any change of institutions is likely to be gradual and so the 2013 review should include an assessment of the purposes and nature of public examinations at age 16.

Nevertheless, there are good reasons for ensuring that students can continue to be based in a single school or college for their education from age 14 to 19. These include a broadening of accountability from a narrow focus on the proportion of GCSE C+ grades at age 16. Schools which cater for students up to age 19 have a vested interest in ensuring students' readiness for further study post-16. We, therefore, welcome the opening of the debate about arrangements for school and college transfer.

The proposed curriculum framework

At present, there are three main routes for students at Level 3: apprenticeships, diplomas and general qualifications. It is not clear whether the proposed Advanced Diploma is intended to be a replacement for general qualifications only. The hope expressed in the ACME paper that it will bridge the academic-vocational divide suggests that it is intended to be for all Level 3 students.

Paragraphs 2.1-2.4 of the ACME paper give specific details of the Advanced Diploma but the big picture is not well-defined. The proposals need to be clarified and defined in the following ways.

- The structure of the Advanced Diploma is similar to a baccalaureate. The case for this type of qualification needs to be made.
- It is not clear why there should be six subjects nor what is meant by "subjects". Are these academic subjects only, or could they include lines of learning?
- How do the proposals relate to the current diploma framework which includes principal learning, generic learning and additional specialist learning?

- The justification for the Advanced Diploma being awarded on a pass/fail basis needs to be clearer.
- The ACME paper proposes that "All learners should have the opportunity to study English and Mathematics as part of their programmes, and be encouraged….. to do so."[3] However, only students who achieve an appropriate standard in English and Mathematics would be eligible to pass the Advanced Diploma so these subjects would be, effectively, compulsory. The case for this needs to be made explicit.

The Transcript

The idea of having a clear and simple record of students' extra-curricular participation and achievement is a good one. The ACME paper suggests that a credit framework would be established for the Transcript. However, care needs to be taken with the establishment of such a credit framework. Some extra-curricular activities, e.g. voluntary service, will not sit easily in such a framework; it would be wrong if they were regarded as being less valuable because they did not attract credit.

There are three types of activity which might be included in the proposed Transcript:

- Units of learning which are part of the Advanced Diploma
- Additional learning which is not aggregated as part of the Diploma
- Extra-curricular activities which are not easily put into a credit framework.

It would be appropriate for the first category to be included on a list accompanying the Diploma certification. The second and third categories would then be part of the Transcript which recorded learning in addition to that undertaken for the Diploma. The idea of a credit framework for the second category needs to be carefully thought through; a prescriptive and constricting framework would cause more problems than it solved.

The Advanced Diploma

Although the ACME proposal is based on the assumption that most students proceeding to Level 3 study of mathematics will have taken the twinned pair of GCSEs, the arguments in favour of different pathways within an Advanced Diploma hold good from a starting point of a single Mathematics GCSE, or some other provision pre-16.

The idea of three different pathways within an Advanced Diploma has the merits of ensuring that all students at this level of study continue with mathematics that is appropriate to their needs and interests. In order for this proposal to prove successful in practice, a number of concerns need to be addressed.

- The pathways are alternatives within a broader programme. It is unclear what the implications of choice of a particular pathway are for the other subjects that may be studied. This has implications for the possibility of transfer between pathways as well as for students' initial choices. In particular, would transfer to a mathematical pathway which required more hours of study per week mean that students had to "drop" something else? If so, then, combined with the difficulty of catching up the work missed, this would make such transfer unrealistic for many students. Similarly, would transfer to a pathway requiring fewer hours of mathematics per week necessitate making changes to other subjects to make up the hours of study?

- The mechanisms for transfer between pathways, which the ACME proposal rightly says should be built in, need to be carefully thought through to ensure that they are easy to implement in practice. The only specific transfer mentioned in the ACME paper is that between Pathway 2 and 3 early in the course. If that were the only transfer possible, it would severely restrict the options open to students who change their future plans part way through the course. That would be an unacceptable limitation which would oppose the aim of allowing learners to keep their options open.
- In addition to the possibility of moving between pathways, each pathway must be flexible enough to allow for students to follow new directions as their interests develop and change. The introduction of an Advanced Diploma provides the prospect of genuine curriculum development and innovation and this opportunity must be exploited.
- It is important that all three pathways are equally esteemed. The contrast within ACME's proposal between Pathway 1 with "units of assessment … sufficiently small as to recognise progressive achievement"[4] and Pathway 3 whose "assessment would consist of a small number of larger units, most of which might be taken towards the end of the course"[5] could encourage the view that Pathway 1 is for those who are not very good at mathematics whereas Pathway 3 is only for the very able students who are confident mathematicians.
- The three pathways described in the ACME document are for students who have achieved at least grade C in their study of mathematics at GCSE. Some students currently start A Levels without having achieved this and the same will be true of the proposed Advanced Diploma. It may be possible to adapt Pathway 1 to be suitable for students who are concurrently aiming at a Level 2 qualification in mathematics but the details of this need to be thought through.

Statistics is rightly given a prominent place in Pathway 1. It is not mentioned in Pathways 2 and 3, except by implication of Pathway 2 "covering the general goals of Pathway 1"[6] and Pathway 3 subsuming "the mathematical content of Pathway 2"[7]. It is possible that the reference to data handling in Pathway 2 is intended to refer to learning Statistics or perhaps it means that students on Pathway 2 are expected to work with substantial sets of real data. Many students will use statistics in their future study and work and so it is appropriate for all pathways to include some statistics.

The proposed extension papers and synoptic assessment are welcome but the description of the assessment of Pathway 3 as being by means of "a small number of larger units"[8] is unhelpful. What is a small number in this context? What are the units larger than? The implication seems to be that modular courses are incoherent and encourage a fragmented view of mathematics, whereas the description of Pathway 1 recognises the motivating potential of modular structures.

It is important that all the pathways are coherent and encourage a holistic view of mathematics; this cannot be achieved solely through the assessment structure. In addition to well-constructed schemes of learning and assessment, appropriate resources and training for teachers are necessary. ACME's paper rightly recognises the importance of professional development, support for teachers and high quality teaching and learning materials. Properly funded provision for these must be made in any new system.

The amount of time allocated to each of the three proposed pathways appears reasonable. However, it would help to clarify the proposals if the amount of mathematics studied in each pathway was related to current qualifications, in addition to the indication of the level of study which has been given.

It should be noted that significant curriculum development, which has benefited the education of students and the professional development of teachers, has often arisen from projects which had small beginnings. In seeking to prevent "fragmentation of the market"[9] it is important not to stifle such curriculum development by excessive prescription.

Next steps

In order to gauge whether the proposed Advanced Diploma, with its three mathematics pathways, will be workable in practice, the next step is to work up the proposal in some detail; this will include work on the other content of such a Diploma, as well as the mathematics. Such work should deal more with the structure of the Diploma rather than seeking to specify all the content in detail, but it may be useful to exemplify possible content to demonstrate the workability of the proposal. It will be necessary to consider how much choice will be possible within the Diploma, as well as within the mathematical pathways, and how students and teachers will be informed about the implications of these choices.

There needs to be sufficient detail to demonstrate the workability of the proposal and also sufficient flexibility to allow variety of provision and curriculum development. This balance must be reflected in subsequent regulation of the qualification. It is essential that the new qualification is sufficiently flexible and adaptable to meet the needs of all its target students.

The outcomes of ACME's Mathematical Needs project will feed into future discussion about Level 3 mathematics, as well as discussion about mathematics education at lower levels. The forthcoming 2013 review of qualifications provides an important opportunity to consider what coherent and appropriate mathematics education should look like. The implications of proposals must be fully considered to ensure that their implementation lives up to the vision.

Notes

1. http://www.middleschoolresearch.org.uk/middschinfo.html

2. Participation in education, training and employment by 16-18 year olds in England, SFR 12/2009 (DCSF June 2009)

3, 4, 5, 6, 7, 8, 9. Towards Level 3 Mathematics in 2016: A paper to provoke discussion (ACME 2009)