SMC&PA Submission 225
Received: 13 May 2013

Submission to the Education and Innovation Committee enquiry into Assessment Methods for Senior Maths, Chemistry and Physics

Background: I have been a teacher of Chemistry, Physics and Mathematics for the last 35 years. I have taught in the ACT, NSW, UK, China and Queensland. I attended training and have taught the International Baccalaureate Syllabus. In the UK I was Director of the Science College in a very successful Grammar School; in China I was Principal of an International School for Chinese students and I am currently Head of Mathematics in a State High School. Over this time I have observed the way that students have worked and coped with the myriad of ways that Educators have attempted to gauge their mastery of concepts taught. As a teacher, at times this has been baffling, enlightening and at all time a privilege to work with talented children.

Submission:
I, like a number of your submitters, am shocked at the standards of a number of the students I teach. After spending 6 years teaching overseas, and working in China with students who have such a thorough grounding in Mathematics, I was not prepared for the lack of basic mathematical skills exhibited by students in Queensland. A number of students finish their primary school education basically innumerate. They cannot handle fractions, place value or times tables with any degree of competence. They then go onto completing year 12 with few of the mathematical skills required to be successful.

Merv Myhill in his submission mentions the skills of Asian students. When I worked in China we were interested in the so called “Asian gene for Mathematics”. We found that this mathematical ability was as a result of more time being devoted to the study of mathematics from an early age and the use of rote learning early in the student’s studies to ensure a grasp of basic concepts. The Chinese system of counting was another factor that reinforced their grasp of place value. We need to emphasise this back to basics approach in our primary schooling to make the improvements we need in our maths results. This means that the way we recruit and prepare our Primary School Teachers will have to be more rigorous in the future to ensure that they have the skills to be able to properly prepare our students.

You may then ask though, how does this apply to assessment methods in Senior school? I believe that the current methods of assessment are an attempt to deal with this basic innumeracy problem. The concept of all students experiencing success so that they don’t feel bad about themselves is sugar coating. The reality of Naplan is a more realistic snapshot of how our children compare to the rest of the country. We can get caught up with the fact that those children who are more literate will do better at Naplan, but the bottom line is a lot of our children are poor at maths. We need to get back to basics, ensure our students can use and manipulate numbers, before we try to be too clever.

I read with interest the submission by Doug Goldson, who laments the application of the “Communication and Justification” criteria in senior mathematics and he questions worth of this criteria. I would like to support this assertion and add that I am very concerned with its equal weighting with “Knowledge and Procedures” and “Modelling and Problem Solving”. This does nothing to reward those natural mathematicians and everything to reward those

who have neat setting out. The application of this criteria too often becomes an afterthought by some teachers, is too subjective and it is paid lip service by panels. It does little to indicate a student's true mathematical ability. Whilst I don't argue the value of good setting out and the development of a logical sequence, it does disadvantage natural mathematicians and discourage those light bulb moments of insight. I think, like other submitters, that this form of assessment disadvantages our boys.

I am concerned about Panels being able to maintain impartiality. I like others have seen work programs and assessment pieces being satisfactory for a number of years, suddenly not being OK in another. Panel chairs are reluctant to interfere and we hear rumours about certain panellists being tougher than others. If the criteria are easy to interpret, why do we still have these problems? If teachers don't understand the criteria, how can students possibly understand them?

As for criteria based marking v's the awarding of marks, I think that there is a place for both. Certainly, a mark based assessment of Modelling and Problem solving could be seen to be just seeking the "right answer". With the grade based assessment we use, in the right hands, can reward those students who know what to do but make a simple mathematical error and push the wrong button on a calculator. I have seen too many marks awarded to questions which involve a number of steps but are really only testing a low level skill. However, if we are testing recall or simple knowledge, it could be argued that a mark based assessment is the most judicious and efficient method of assessing competence.

I would like to see a system somewhat similar to IB. A mixture of;

1. A final exam, common across the country,
2. Internal teacher marked assessment of extended Modelling and Problem Solving (Course work), samples externally moderated, the topic set and changed yearly by ACCARA. To get over the problem of teachers coaching and applying multiple drafts, the writing of the assessment could be under exam conditions.
3. And teacher based internal monitoring of set criteria. (This may include tests, assignments and other tasks.

With the current system using the QCS as a tool to rank schools, it is difficult for an exceptional group of students coming through a school like mine to get the OP results they deserve. I believe the system I am proposing can go some way to addressing this concern.

I don't support a single exam to assess all. It is obvious that we have students who are poor exam performers and that exam results are not a true indication of their mathematical ability. With the model I propose, I believe that we can ensure that we satisfy the assessment styles of most students

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