SMC&PA Submission 139
Received: 13 May 2013

To: The Education and Innovation Committee
Subject: Assessment methods used in Senior Mathematics, Physics and Chemistry

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I have taught secondary mathematics at all levels for 38 years in NSW, Singapore and Queensland. I have taught Year 11 and 12 Mathematics A, B and C in Queensland from mid 1994 to the present day. I have served on Mathematics A, B and C panels for most of my time in Queensland; I have a Bachelor of Science with a Double Major in Pure Mathematics and Mathematical Statistics; and a Masters Degree in Mathematics Education in which my Dissertation was on Assessment of the Mathematics B Course.

Assessing against defined standards, rather than numerical grades, does **not provide valid indicators** of student's achievements and knowledge of mathematics. In particular I site reliability as a key problem in this area. The QSA is not effective in empowering schools in reliably implementing a defined standards approach to curriculum and assessment and as a result is ineffective in supporting schools in awarding valid grades of achievement in Mathematics to the students of Queensland.

> A simple modification of the Mathematics C Work Program at my school was submitted in July 2012 for approval by the QSA District Panel. Our expectation was that the Work Program, originally approved in 2009, would come back approved, since the resubmitted Work Program differed from our original submission in the choice of Option Topic only. The Work Program was sent back to us for modification in three areas, which were unrelated to our choice of Option Topic. This necessitated the Work Program being sent for closer examination to the State Panel who proposed a further change. The need for these four changes suggests that the original Work Program should never have been approved on four counts. This suggests that the panel is unreliable in approving work programs.
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> Our existing Work Programs in Mathematics A and Mathematics B could fail on three of the four counts discussed above because they contain the same issues. In effect, three different panels erroneously approved all of our Work Programs in 2009. This further suggests that the panel is unreliable in approving work programs, a key step in the implementation of any new syllabus and a key component of the assessment process.
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> It is also worth noting that none of the four issues discussed above arose as concerns to any of the Mathematics C, B or A District Panels in any of the twenty one assessment submissions made between December 2010 and today. This suggests that the QSA District Panel is ineffective in ensuring correct implementation of the syllabi in Mathematics and therefore unreliable in supporting schools in awarding valid grades of achievement in Mathematics.

Teachers of Senior Mathematics find the feedback given by the District Panels confusing and frustrating and have little faith in its ability support them in awarding valid grades of achievement in Mathematics to their students. Comments from teachers include:

- "Our assessment package was approved last year so we continued to use the same one, only to have it knocked back this year with significant concerns";
- "The feedback from the panel is so vague as to be next to useless. It is like the blind leading the blind";
- "I didn't think it could get any worse but it has."
- "My school is currently using a Maths B Work Program which should never have been approved. And we are probably not the only ones. I know that 190 schools got knocked back on the same issue by Wayne Stevens from the QSA."

The work load on students in Senior Mathematics varies from school to school and can often be unreasonably high. There is no stated word limit in any of the Mathematics A, B or C Syllabi and as a result schools vary widely in their expectations of size and depth of student submissions and therefore time spent.

> The vast majority of students submitting 1500 words or less (in the broader sense of words, numbers, equations, graphs and diagrams) would do poorly in the current climate. I recently analysed the work from my best student in 2012. She was graded at the highest grade possible, VHA10, and submitted two assignments in 2012. One had 5700 words in it, the other had 2970. However the 2970 is a gross underestimation of the volume of text because Microsoft Word counts one line of Algebra as one word. Her submission contained 125 lines of algebra 50 of which would have contained 45 symbols or more. It is worth noting that typing a line of algebra with 45 symbols in it takes much longer to type and proof read than a line of text. It is unlikely that she would have earned a VHA10 had she not done this volume of work.

There has been a decline in the percentage of students starting and completing Mathematics B since the current system of assessment was started in the 1990s.

Year	% of State Started	% of Starters Staying	% of State Completing
1996	48	82	39
1997	48	82	39
2006	40	77	31
2007	39	76	30
2008	38	74	28
2009	37	74	27
2010	36	75	27

In short:

1. Assessing against defined standards, rather than numerical grades, does **not provide valid indicators** of student's achievements and knowledge of mathematics.
2. Teachers of Senior Mathematics find the feedback given by the District Panels confusing and frustrating and have little faith in its ability support them in awarding valid grades of achievement in Mathematics to their students.
3. The work load on students in Senior Mathematics varies from school to school and can often be unreasonably high.
4. There has been a decline in the percentage of students starting and completing Mathematics B since the current system of assessment was started in the 1990s.

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