SMC&PA Submission 172
Received 12 May 2013

To: The Education and Innovative Committee

Subject: Assessment methods used in Senior Mathematics, Physics and Chemistry

Dear Committee Members

I have been following with great interest the work your committee has undertaken on the assessment methods in Senior Mathematics, Chemistry and Physics.

I am a Physics teacher and a panel member in Queensland. I request that my personal details be withheld from publication please.

I make this submission (i) to point out some of the incorrect statements made by Mrs Patrea Walton, the CEO of QSA, in the committee's briefings and (ii) to argue for a better syllabus and assessment system.

In the public briefing held on 7 March 2013, Mrs Walton said, and I quote, "*Let me be clear: QSA has not banned the use of marks. QSA has not banned the use of marks.*"

In July 2008, the QSA published a document, titled "**The importance of instrument-specific criteria and standards: Moving on from marks**". It was addressed to chemistry and physics teachers. It states, and I quote, "*Attempting to encode syllabus standards in numerical grading systems, by definition, separates the criteria and standards from which the marks were derived. Not only is such practice inconsistent with syllabus intent, but it may also disadvantage students because they may not be well informed about the specific areas of their strengths and weaknesses*".

Mrs Walton now appears to be saying that numerical grading is consistent with syllabus intent.

The fact is that all physics teachers have been using letters instead of numbers because that was what QSA insisted teachers do. Why else would every teacher in the state use letter grades?

The above-mentioned document is no longer available on the QSA website. It is, however, available on the PLATO QLD website.

In the same briefing, Mrs Watson said, and I quote, "*Reliability refers to the degree to which a process is consistent and stable, and yields the same outcomes and results on repeated applications.*"

On the physics teachers forum, called 'the physics discussion list', run by the Department of Education and Training, many teachers have questioned how it is that a panel can rate an assessment piece exceptionally highly in one year and then savagely criticize the same piece the following year. Whenever this issue has been raised with the QSA, its response has been

that one must not compare what happens in one year with what happens in a different year. Mrs Walton needs to explain how this sits with her reliability test.

A little later, Mrs Walton said, and I quote, "*Satisfaction with the syllabuses is consistently over 80 per cent in the annual survey of schools, even in the year following the introduction of the new physics and chemistry syllabuses.*"

I have been teaching Senior Physics in Queensland for over 10 years and have been a panel member for a number of years, but I have never been asked by the QSA in any of its annual surveys if I am happy with the syllabus. None of the teachers I have spoken to is aware of such a survey. We need some details of this annual survey. Are the schools chosen randomly or are they just the schools which took part in the trial syllabus or are they just the schools that are on QSA's 'friendly schools' list? Is there any reason why the QSA does not ask all physics, chemistry and maths teachers in Queensland what they think of their respective syllabuses? Where can one find the questions asked in these annual surveys and where can one find the results of these annual surveys? Going by the submissions EIC has received so far, the satisfaction figure appears to be less than 10 per cent. Mrs Walton needs to substantiate her claim.

In the same briefing, Mrs Walton made an analogy of cricket selection with student assessment. I do agree with her that the cricket selectors do not base their selection solely on the cricketer's batting average, but also consider other relevant factors. But, what they do not do when selecting a batsman, is to equally weight all the skills and then refuse to select a batsman with an average of 80 runs, simply because he is not as agile on the field as another cricketer. Surely, if one is selecting a batsman, his average should be a much higher consideration than his occasional failure to field the ball neatly. Nor would the selectors impose a selection criterion that requires the batsman to have empathy for the people of the cricket-playing nations, saying that our cricketers represent Australia and as such will need to be good ambassadors, and then insist this criterion has equal weighting as each of the other criteria, including the batsman's average. Yet, this is exactly what is happening with the physics syllabus. Please allow me to elaborate. In the KCU3 criterion, there are opportunities to ask questions that test a student's skills in the understanding of concepts, in the selection and use of right formulae and in problem solving strategies to arrive at the correct answer. These questions rightly deserve an A grade. But, one of the EC criteria requires students to present data using an innovative use of formats. A student presents the data in a table and highlights all high values with a smiley face, all middle values with a neutral face and all low values with a sad face. The student argues she has analysed the data and is presenting it in an innovative format as required by the A-level criterion. She demands an A, while her father who happens to be a mathematics teacher in another school, looks on. This is what we, as teachers, have to deal with. There is no room for us to say that the KCU criterion is worth 4 times the EC criterion. The cricket selector, on the other hand, can say that batting average is far more significant than a batsman's ability to field the ball neatly or that lack of empathy for the Bangladeshis should not be an issue in selecting a good batsman.

In the expert advisory forum held on 1 May 2013, Mrs Walton said that typically in Year 12 physics, students did one EEI and 5 exams. This needs rebutting.

The requirements for verification folio in physics are set out on page 28 of the syllabus. It requires a minimum of 4 assessment items and a maximum of 6. The folios need to be sent to QSA at the end of Term 3, giving 30 weeks for schools to complete their assessments. Given the excess amount of time it takes to set and mark each assessment item, it is not only impractical to conduct more than 4 assessment items in that time, it would be unfair to burden our students with a major assessment piece every 5 or 6 weeks of their course in every subject. A typical Year 12 physics verification folio contains 4 items. Of the ones I have seen, the majority have one EEI, one ERT and two exams. I have also seen folios with

two EEIs, one ERT and one exam and
one EEI, two ERTs and one exam.

There is one assessment item conducted after verification, and it can be an EEI, an ERT or an exam.

Mrs Walton's claim of 5 exams in Year 12 physics is way off the mark.

It must also be remembered that writing skills are tested not only in EEIs and ERTs, they are tested in each exam, as part of the EC criterion.

The fact also remains that the syllabus allows schools to give just one exam in Year 12 and this exam may be given at any time on any context, e.g. in week 5 of Term 1 on 'Guitar Sounds' or 'Footy Physics'.

In Queensland we have the world's silliest syllabus and the world's most radical assessment method. A sensible syllabus would tell teachers what topics to teach, for how long and to what depth. All schools in the state can then plan and deliver lessons in a consistent way. In Queensland the syllabus is organised, not into topics, but into 'organisers', 'key concepts' and 'key ideas'. Topics can belong to multiple organisers, multiple key ideas and multiple key concepts. A key concept can span across a number of topics. A key idea can be common to a number of topics. It is a muddle. The physics syllabus is written in such a way that it is beyond most people to make sense of it. Nowhere does it give useful directions such as, Electricity should be taught over 10 weeks covering such and such concepts, but it has pages dedicated to themes such as Language Education and Educational Equity.

Unlike in other jurisdictions, Queensland teachers do not teach traditional topics such as Mechanics, Electricity and Light, but they choose their own 'contexts' and teach these contexts as they please. Some examples of contexts are: Sport Physics, Automobile Physics, Bicycle Physics, Sound of Music, Physics of Movies, Physics around the Home, Dreamworld Physics, Physics of Surfing, Physics of Ancient Weapons, and Physics at Olympics.

Physics text books across the world are written in an orderly topic-by-topic fashion. The syllabus does away with this approach. Instead, you choose a context such as 'Automobile Physics' and teach a little bit of dynamics so that students can understand motion and force, a little bit of electricity so that they know how the auto electrics work, a little bit of Chemistry so that they understand the properties of petrol and diesel and a little bit of damage done to the environment by the exhaust fumes and by the use of fossil fuels. In the exam you ask them to explore, from a physics point, the ramifications of not maintaining an automobile regularly. You then study the response and decide whether the student has explored the scenario, analysed the scenario or explained the scenario and award an A, B or C grade accordingly. This is hotchpotch science, not physics.

We need a sensible syllabus and a sensible assessment system. The syllabus needs to be developed, not by education theorists or education scientists, but by a panel of physics professors, teachers, engineers, and technology and industry based scientists. All schools should be able to sing from the same syllabus sheet in unison. We also need an assessment system that gives reliable results and allows accurate comparison of student performance and school performance. An external exam will take care of this.

The QSA has failed miserably in providing the state with a sensible education system. We need to abolish this organization and start afresh. The students, parents, teachers and the wider community deserve and expect a competent organization to run this state's education system.

Thank you for considering my submission.

Yours sincerely,

12 May 2013.