

Submission to:

The Parliamentary Inquiry into assessment methods used in Senior Mathematics, Chemistry and Physics in Queensland schools

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The following submission will address the following criteria of interest to the Committee and is based on my personal background and experience in teaching at a Regional Queensland State High School. I will conclude the submission with a short summary regarding my thoughts regarding best outcomes for these subjects.

- Ensuring assessment processes are supported by teachers
- Student participation levels
- The ability of assessment processes to support valid and reliable judgments of student outcomes.

Ensuring assessment processes are supported by teachers

To ensure that assessment processes are supported by teachers they must have the ability to set and manage the assessment tasks to fit in with the mandated syllabus requirements of say EEI's and SA's for physics or Assignments in mathematics. Such items should both generate meaningful data regarding the student's achievement and be used as a task that is a learning experience in its own right. While in the early days of the new syllabus this may have been problematic, after some 5 years, most teachers have, through professional networks, acquired really good assessment tasks that meet both of these goals.

It has been desired and promoted that in a large State such as Queensland assignment-type tasks requiring some extended investigation either in Maths or Science be related to local conditions and take advantage of local expertise or business located in that region. Failing that there should be an attempt to design the tasks to engage the student's interest and link theoretical concepts to real-world situations. To that end I have designed an Extended Experimental Investigation in Year 11 Physics where students build their own Trebuchet's, Catapults or Ballista's and then use those machines to test and investigate Physics principles of Energy, Motion and Force. In Year 12 students conduct an Extended Response Task on Avionics investigating the sending and receiving of radio signals and as part of the task use kits to build their own radio receivers.

This sort of hands-on assessment is interesting for the students as they explore a task; is exciting for the teachers as they see the students expand their understanding way beyond what was required by the syllabus and it generates professional interest between teachers as they compare and contrast various assessment tasks to achieve the best student learning outcomes.

Student Participation Levels

While I am a fervent advocate for mathematics and science to meet the challenges of the 21st century we live in, sadly the numbers of students choosing the higher level subjects continue to slowly subside at my school. This year for the first time I have now had to teach a combined year 11 / 12 Physics class because of the drop in numbers {It may also have been as a result of our much lower student numbers resulting from the flooding at the start of this year in North Bundaberg}. We only have one senior Maths B class in Grade 12 while seven or eight years ago we would have had two full classes. Potential reasons for such a drop are listed below in no order of importance:

- Three private schools have opened in the town and have actively recruited the “top end” primary students from our feeder schools.
- Until the implementation of the Australian Curriculum, standards in mathematics had fallen to very low levels such that in 2011 over 40% of students entering Year 8 at our school did not know their times tables.
- Students are not required to actively commit concepts to memory in Primary schools for summative assessment exams and when they come to High schools they do not want to engage in such activity.
- The most common question I am asked at subject selection talks by year 10 students is – “What is the easiest mathematics subject I can take?” This is a Gen Y attitude.
- Most students have after school jobs to earn money to support their i-phone “habits”. The acquiring of such cash is seen as far more important than completing assigned schoolwork tasks. If their boss requires them to work extra night hours that will always take precedence in their personal life.
- Students with high sporting and social commitments do not want to also engage in high level academics as well because of potential burn-out.
- More and more students are entering school with defined medical issues such as ASD, ADHD, Depression, etc. These disabilities militate against the highly disciplined and focussed efforts needed to succeed at Senior Maths and Science subjects.
- Science and Maths is not sexy. It’s not cool. It’s not seen as fun but rather something to be endured.

Having said all that, I must emphasise that for the albeit smaller number of students engaging in these harder subjects of Physics and Maths B and C, the quality of the work is outstanding. I have just finished marking my Year 12 Extended Response Task in Avionics / Electronics for year 12. One of the students – Rachael B, has done such an outstanding job that I apologised on her paper that I could only give her an A+ for her work. It is students like that who will be an outstanding success in whatever career she chooses. My own daughter completed Year 11 and 12 under the new mathematics and Physics syllabi at North Bundaberg State High School. She went on to graduate with first class honours in Civil engineering from CQU. She was awarded a Main Roads academic scholarship and is currently serving as a Project Manager for Road Tec in the Mackay region. I have many other such stories of successful students I have taught from our school.

The ability of assessment processes to support valid and reliable judgments of student outcomes.

As a Head of Department I am fully aware that any assessment processes either in senior mathematics or physics must be: a) understandable, b) relatively easy to use, c) lead to defined standards of ability of students and d) produce the correct outcomes all the time for students being subjected to the assessment regime. The QSA has adopted criteria based assessment to meet these ends allied with subject based moderation from expert teachers within those subjects. Within my school at North Bundaberg State High School and within the Bundaberg District in general, I have not found any huge ground swell of teacher anxiety or resentment at the concept of criteria based assessment, once it is explained to them. On the contrary it is often easier at parent teacher interviews to point at a single or several criteria that a student may be having difficulty with, than simply referring to a percentage grade on a report. It is also easier as a professional teacher to target any remedial work that a student may have to undertake to improve his/her grades as a result of taking the assessment.

Most anxiety that I have personally heard expressed by teachers involves interpretation of the wording of some of the criteria standards. I feel in mathematics that was addressed very early in the implementation of the last round of the syllabus by explaining that “complex” simply meant a multi-step problem, while “routine and non-routine” applied to whether the student had significantly rehearsed that type of maths problem in their course of study. The physics syllabus however has consistently been the target of continued animated discussion regarding the meaning of certain terms and/or the possible overlap of the criteria (KCU and EC in particular). It must be said that at a local school, District and State Level, any such ambiguity can easily be dispelled by having direct and meaningful discussions with the QSA Senior Education Officer representing that subject.

Each year the State Panel conducts comparability analysis over two days to see if an A standard in Cairns is the same “value” as one in the Wide Bay or in Central Brisbane. If teachers are genuinely setting the assessment as outlined in the syllabus and uniformly applying the exit criteria to those pieces of assessment, then there should be comparable results across the State. In general in 2012 there was a high degree of comparability across

the State for Physics. I assume the same was true in mathematics although I was not involved in that investigation.

Concluding Thoughts

I am impressed that much of the current push to dismantle the current school based moderation system in favour of externally sat State-wide exams has come not from a High school Physics teacher but a university lecturer. While there is no doubt that Mr Ridd has garnered some disaffected teachers in support of his aims, I am continually impressed by the fact that the majority of teachers in Queensland simply get on and do the job of providing quality teaching to our young people.

Do I think the current system is fool proof and needs no “tweaking”? Of course not! That is what professional discussions and forums are all about. As a relatively new teacher of Physics at my school I was chosen to be the school’s liaison when the new Trial Pilot Physics syllabus was first mooted over 10 years ago. I have remained through the various incarnations of Pilot and then Final syllabus implementation. Through that whole process I have believed that teachers views were listened to and ideas sought.

There is one thing I can guarantee. If our students were once again subjected to the sort of pressure that comes from taking one final summative exam at the end of grade 12, there would be an even greater flight from the more “difficult” subjects than exists at the moment. No real investigative tasks would take place as teachers would spend every waking moment “teaching to the test” to ensure the best outcomes for their students – to no discernible benefit in their development.

I have happy, engaged and successful students here at North Bundaberg State High School and should the committee so wish I would love to invite you here to talk to them about these matters.