Submission to the Education and Innovation Committee inquiry into Assessment Methods in Senior Maths, Chemistry and Physics.

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1. Background

I have been a teacher in Queensland High Schools for 25 years. I have taught Physics every year since commencing service in July 1988.

I became a member of the District Review Panel for Physics in the Cairns region in 1995. I became a member of the Brisbane-Ipswich review panel shortly after I moved to South East Queensland in 1996. I was involved in the Trial-Pilot of the new Physics Syllabus and remained involved when the syllabus went to extended trial. At this time I sat on the combined panel in Toowoomba for schools in the extended trial. After the release of the new syllabus in 2007 I moved back to the Brisbane-Ipswich panel and have been a member of that panel since.

I am currently Head of Department for Science at Boonah State High School, a position I have held since 2001. As such I am familiar with both the Physics and Chemistry syllabuses, although my primary expertise is in Physics.

2. Observations on criterion-based assessment and teacher judgements

As an experienced teacher, curriculum leader and participant in the quality control mechanisms of the Queensland system, I feel I can speak with some authority on the subject of assessment, standards and the link to good classroom practice and student learning. Queensland has employed criterion-based assessment since the 1980s. It is part of our culture as teachers and we are good at writing and interpreting standards. We are also good at assessing the quality of student work against these criteria.

My experience as a panellist is that, for the most part, judgements made at different schools are remarkably consistent. Far from being the result of teacher guesses, as was stated at the inquiry, there is remarkable consistency across schools when judgements are reviewed by panels. There may be disagreements but these are generally at the margins and serve to allow panellists to give advice to teachers in schools about quality of assessment and application of standards. Relying on teacher judgements has not seen a reduction in standards or rigour, rather it recognises the professionalism of teachers and helps them build capacity for improved future judgements.

One thing that is forgotten in the debate about the value of standards vs. marks, is the link between the criteria and standards, learning intent and quality teaching and learning. A well-constructed set of standards sets out what we value, just as a set of criteria (or general objectives, as they are also known) identify and make clear the things that we want students to learn in the course of study. The move from a numerical marking system to one based on standards allows teachers to share the process with students and to show them what we are looking for in their work. The standards facilitate meaningful feedback to students which has been shown to be a powerful tool for improving the quality of student work (Hattie, J. and Timperley, H. (2007).

Standards are about the quality of the work, not about how many lines of a problem a student has managed to complete. Under the marks-based system, that is what students were marked on: if the answer to the problem was complete, they got 5/5. They got 1/5 for writing down the

correct formula, and so on. While this system was clear and simple in its way, it was often about quantity, not quality of student responses. As we were encouraged to set more open questions in exams, the marks were still determined by how much was written in response.

It is possible to use numbers to signify quality, just as it is possible to use them to signify the standard at which a student response matches a criterion. I would be perfectly happy for a teacher to use marks in this way, provided it is made clear how the marks relate to the standards. However, in communicating the significance of the marks to the student or their parents, the teacher would inevitably find themselves referring to the verbal standards, otherwise how do they justify the marks awarded?

3. Methods of Assessment

When I started teaching physics, we had exams and we did *prac write-ups*. Student outcomes were determined almost exclusively by how well they did on the exams. These exams overwhelmingly consisted of multiple choice, short response and extended problem-type questions. When we moved to the idea of "Complex Reasoning" with the 1998 syllabus, the "complex reasoning" usually meant more difficult, multi-step questions. There was very little variety in the types of assessment used up until the Trial-Pilot began in the early 2000s. The introduction of extended tasks in the Trial-Pilot syllabus opened up many new ways that students could demonstrate their ability to think about the ideas in Physics.

There has been some suggestion that the extended tasks disadvantage some students because they are not capable of writing at the standard required. I have even heard some suggest that boys are discriminated against because of this, as if boys are inherently semi-literate and incapable of writing more than a sentence or two at a time. This view is incredibly sexist and devalues (a) the talents of our students and (b) the need to develop these abilities in all our students if they are to succeed in the world. As I understand it, all scientists are required to write and to present their ideas at seminars and symposia, so why shouldn't we develop these skills in our students? Most objectionable in these sorts of arguments, of course, is the implication that we must be favouring girls and allowing them success at the boys' expense. I find these arguments ridiculous and offensive, both as a teacher and as a parent of a son and a daughter.

Rather than disadvantage students, the extended tasks give students opportunities to engage in physics in authentic and interesting ways. Extended Experimental Investigations (EEIs) require students to actually do physics, as physicists do. We used to give students scripted experiments, where everything is set out and the results a foregone conclusion. We still do this, of course, and they are a valuable part of learning. However, EEIs are a powerful way for students to learn, not only new concepts and ideas, but also the scientific method. From proposing a hypothesis to assessing risk and managing experiments through to evaluating results and making conclusions, the EEI is about doing science, not just learning about it. The other extended tasks (ERTs) provide many and varied ways in which to engage in a topic and can also be powerful learning experiences in their own right. I particularly enjoy learning new things as a result of a student's research. Why should they be limited by what I know?

Finally, a word about practicality in EEIs. I have heard it said that they are drain on resources and are difficult for remote students and so on. These arguments are meant to imply that a student at a wealthy city school will have more opportunities to do a "good" EEI than a student at an under-funded school in the outer suburbs or small town. Speaking as the Science HOD at a small rural high school, I can say that this is absolute nonsense. The wealthy city school may well have

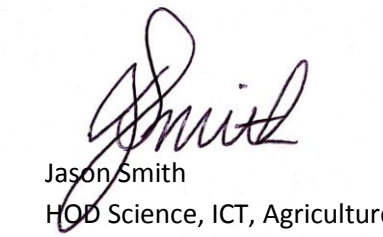
more data loggers or fancy equipment, but these are not needed. Again, it is about learning intent. Nowhere in the standards does it say that student must record using expensive equipment. We all have laptop computers and internet access, and we are all able to collect, analyse and evaluate data, even if that data is collected with a stopwatch and a toy car rather than an expensive, frictionless cart and a data logger. Over the more than ten years I have been engaging students in EEIs, I have seen a wide variety of experiments performed with mundane apparatus, under a variety of conditions. Students love doing EEIs in my experience and benefit greatly by the practical application of theory.

4. Participation

Numbers in physics have been stable during my time at Boonah State High School, fluctuating around the low teens. I have class rolls dating back to 2006 and the numbers enrolling in year 11 physics in those years are: 15 in 2006, 11 in each of 2007, 2008 and 2009; 6 in 2010; 14 in 2011; 11 in 2012; and 18 in 2013. Numbers were not very different before then, typically in the range of 10 – 15 students enrolling every year.

5. Conclusion

School based assessment is integral to the way education has been done in Queensland for decades. Queensland teachers are experts in this and are highly literate in terms of their understanding of curriculum, assessment and standards. Having a variety of ways that students can demonstrate their understanding and abilities in subjects such as physics, underpinned by a set of clear standards that are understood across the state, does not disadvantage anyone. Rather, it opens up these subjects to a greater range of students who might not have been able to engage with a purely mathematical curriculum, as was the case when I first became a physics teacher. Assessment *for* learning, not just *of* learning, is a powerful tool for teachers to develop a range of skills and abilities in their students. Not all teachers like it, it's true. However, the difference this has made for students is immense. I would hate to see the good work of a decade thrown away because a small group of people have struggled to adapt to change. Perhaps there is a need for more professional development in this area and I am willing to help teachers who are struggling to interpret standards or design good assessment under this syllabus. But look at the standard of work that students produce across this state - the creativity, the variety and the depth of knowledge that has resulted from the changes. The only reasonable conclusion is that we can't go back to the way things were. We have too much to lose.



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