SMC&PA Submission 216
Received: 13 May 2013

Submission to the Education and Innovation Committee inquiry into Assessment Methods in

Senior Maths, Chemistry and Physics.

Authors: Rodney Earl

Summary statement: *I support the current system of school based, criteria based decision making as the primary process for assessment currently in place in Queensland as the best system to make decisions about student standards because it has been shown to make the fairest judgement of what students know and can do and I would not like to use a completely mark based or exam based system as it is more likely to be unfair to individual students. Differentiation is a current priority in Queensland Education. Criterion-based assessment and teacher judgements allow opportunity for students to conduct research, hypothesise, experiment, analyse, synthesise, evaluate and make conclusions about phenomena in connecting with their world.*

1. 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.

From a teacher and curriculum manager's perspective, the assessment processes in current use by the QSA for Mathematics, Physics and Chemistry are not only viable and doable but are preferred by myself and the teachers I have worked with over the years. The primary reason for this statement is that these assessment processes have been shown to be more fair to students than a purely mark based system. Teachers regularly examine the validity of their decisions regarding student assessment against their anecdotal observations and have overwhelmingly stated that criteria based assessment leads to better decisions. In internal moderation processes, decisions have been shown to be valid and reasonably consistent. These decisions have been overwhelmingly accepted by panels of teachers examining the consistency of decisions across a number of schools over the last 5 years.

Judgements made at different schools are reasonably consistent. Far from being the result of teacher guesses, as some would have us believe, 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 seen an improvement in standards or rigour and it recognises the professionalism of teachers and helps to build capacity in them.

Peter Ridd's description of marking an exam to criteria as fundamentally *'a guess'* is misinformed and detracts from reality in the classroom. This is an opinion, unsupported by observations in schools. Teachers use much more systematic and intelligent versions of the process to come to a meaningful decision. He made the point that marks are banned in Queensland, which is not true. Marks can be used and are used, where their use is valid with respect to criteria. Teachers are remarkably consistent in their decisions. This does not mean that improvements cannot be made to the system, mostly with respect to professional development of strategies to be employed. If there are to be any changes implemented in the way of some percentage of the assessment for Science being external exams, comprehensive professional development and quality support will be required.

One thing that is forgotten in the debate about the value of standards versus 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 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 is a powerful tool for improving the quality of student work.

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. Teachers can 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 standards, otherwise how do they justify the marks awarded?

2. Methods of Assessment

Previously students had exams and wrote practical 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 opened up many new ways that students could demonstrate their ability to think about the ideas in Science.

Professor Ridd also commented about the time spent on Extended Experimental Investigations (EEI) and Extended Responses (ERT). He stated that as much as a term could be spent on a single investigation. This indicates a lack of understanding of what really happens in these tasks. It is true that a whole term (10 weeks) is often spent on the task, however 5 to 7 weeks of that time is actually spent teaching the range of concepts required. The 3 to 4 weeks remaining gives time for students to research and develop the understandings in a more specific manner that they then demonstrate in the doing and reporting on the task. This process gives students a very rounded and complete approach to what science is all about, understanding concepts then researching and testing ideas related to those concepts.

Regarding workload of teachers: It is true that teachers spend more time marking extended writing than marking exams to a simplistic mark based system. My observation of myself and the teachers for whom I am responsible, is that they gladly give this time because the result is more fair to their students. Feedback is more explicit, timely and constructive. Contexts help all students, including males to appreciate the importance of the work in the community. For teachers, a decision that is unfair to any particular student is anathema, something to be avoided at all costs. In this respect, the only benefit of a total external examination system is that any unfairness is usually hidden from the teachers and so they do not have to be responsible for the problem.

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. These skills need to be developed 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.

Rather than disadvantage students, the extended tasks give students opportunities to engage in physics, chemistry and biology in authentic and interesting ways. Extended Experimental Investigations (EEIs) require students to actually do physics, chemistry and biology as scientists do. We used to give students scripted experiments, where everything is set out and the results a fore-gone 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 all 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.

It has been said that EEIs are a 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. 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

all are 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. Students have had the opportunity to engage in a wide variety of experiments performed with mundane apparatus, under a variety of conditions.

3. 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. **Assessment *for* learning, not just *of* learning,** is a powerful tool for teachers to develop a range of skills and abilities in their students. The standard of work that students produce across this state - the creativity, the variety and the depth of knowledge has resulted from the internal criterion-based assessment opportunities.

We would trust that the evolution in the education revolution has gone well and truly past the "good?" old days. Peter Ridd is welcome to the 21st century where the goal is to provide equal opportunity for all students. The only reasonable conclusion is that we must continue on the developmental path built over the last decade. We have too much to lose.

HOD. Science

[redacted]