

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

My personal details: **(Not for publication, please)**

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Dear Committee Members,

May I request that my personal details, including all parts of my name, be withheld from publication please?

As an experienced teacher of Senior Physics (more than 10 years in Queensland), and as an experienced panellist I make this submission for your consideration.

Summary of my submission:

- The assessment processes are unnecessarily cumbersome, inefficient, unreliable, and unfair to students.
- The assessment methods are not solely responsible for variation in student participation levels.
- The assessment system is open to fraud and encourages cheating by teachers and students.

## Addressing the Terms of Reference

### Ensuring assessment processes are supported by teachers

I do not support the current assessment processes used in Senior Physics. Almost all teachers I have spoken to, do not support these processes. Here are some reasons why the processes lack credibility.

1. Individual schools choose what topics they teach and to what depth these topics are taught. While one school may spend 10 weeks teaching electricity another may spend just one week on it. While one school may spend a semester on nuclear and quantum physics another may not teach it at all. No two schools follow the same work program, or teach the same topics, or set and mark the same assignments and exams. This makes performance comparison between schools, and between students from different schools, meaningless. In addition, many of our students miss out on important concepts in physics.
2. Individual schools decide how many exams they conduct each year. While one school may conduct four exams and one EEI in a year, another may conduct one exam on any topic and four assignments. Again, performance comparison becomes a meaningless exercise.
3. Preparing exams and assignment tasks takes up enormous amount of time. For each of the nine criteria teachers have to interpret and make sense of five loosely worded grade descriptors, develop suitable questions befitting their interpretation and modify the question so that the expected answers fit in with the descriptors. Many excellent questions requiring proper analysis cannot be asked under this system simply because they don't conform to the criterion descriptors. These are time intensive activities, yet they offer no advantage over traditional way of setting exams.
4. Marking of assignments and exams takes up enormous time. This is because teachers have to match student responses with criteria descriptors from a grid of 45 descriptors and allocate a grade from E minus to A plus for each part of each question. These descriptors are vaguely worded, confusing and are open to different interpretations. Here is an example: To get an A grade, the student needs to explore a scenario; to get a B grade, the student needs to explain the scenario and to get a C grade, the student needs to analyse the scenario. It is up to the individual teacher to determine whether a response is the result of an exploration, an explanation, an analysis or some combination of these. How one differentiates between these terms is subjective for both teachers and students. Similar play on words can be found throughout the grid.
5. Grades obtained in EEIs and ERTs do not necessarily reflect student ability. This is because students often get outside help to complete their assignments. Those who can afford tutors inflate their grades. I knew a student who regularly received Ds and low Cs in the exams and A's in the assignments, thanks to his private tutor. In fact, it was I who suggested to his parents that they consider employing a tutor to

help with his assignment tasks. I give similar advice to parents at parent-teacher interviews. I have, as a panellist, witnessed similar pattern in student profiles from other schools. The system rewards students who can afford tutors and penalises those who can't.

6. In order to receive an A grade one criterion requires students to *present scientific data and ideas to make meaning accessible to intended audiences through innovative use of range of formats*. Another criterion requires them to justify their conclusions and recommendations. Thus, a good essay writing skill is expected in exams and in assignments. This disadvantages those students who are not good at writing essays and those from non-English speaking background. I once had an overseas student who showed excellent problem solving skills but limited English language skills. The student's grades suffered through the senior years because of the emphasis on writing skills.
7. Some teachers award only one grade for each question, while others award anything from 1 to 5 grades for the same question arguing that the question encompasses criteria KCU1, KCU2, KCU3, EC1 and EC2. Teachers can and do interpret criteria descriptors as they please. This is unfair to students and schools.
8. In QSA workshops I attended, teachers were told again and again that marks could not be used in assessments and that grades must not be averaged when determining an overall grade. These issues were discussed extensively on the physics forum over many months. Many examples were presented and not once did QSA offer any constructive solution or suggest using marks. Hence, we do not have a set of rules to arrive at an overall grade. If a student receives C, C, C, B, B, A, A for a criterion, one teacher can argue the student's overall grade is an A since the student has demonstrated the A level ability. In fact this is what I believe the syllabus implies. Another teacher can argue the student is at the B level since the average grade, if averaging were allowed, would be closer to B or B minus than to A or to C. A third teacher can argue the student is at the C level, since that is the most consistent grade for that student. Panel meetings are frequently taken up with similar discussions. A student's grade should depend on his or her performance and not on which teacher determines the overall grades.
9. The verification process is unreliable, unfair, work intensive and full of inconsistencies. What passes as an exemplar in one year by a panel gets severely criticised in the following year by the same panel, albeit by a different member. What passes as an A level question for one school is criticised as a C level question for another school. What passes as a VHA standard in one region is rated as an SA standard in another. What the classroom teacher regards as a HA7 standard can be an SA5 standard to a panellist. In one year, the panel moved each of my Year 12 students by six rungs. After two days of discussions with the panel chair, the students were moved back up to their original placement. Is there not something wrong with a system that allows two panel members to place a student on a particular rung and two other panel members to place the same student six rungs

away and repeat the process for each student in a class? Mine is, by no means, an isolated case. Recently, a teacher wrote to the physics forum saying two of his top students were demoted by 14 rungs each, only to be reinstated a few days later. This system is unreliable in determining student abilities and hence is unfair to students. We seem to have an assessment system that trivialises students' efforts and future.

10. Other jurisdictions around the world do not use a criteria-based assessment method in Mathematics, Physics and Chemistry. To think that everyone else has got it wrong and we are the only ones who have got it right is plain silly.

### **Student participation levels**

I do not believe it is right to attribute variation (increase or decline) in student participation in Mathematics, Physics and Chemistry to assessment methods alone. Students choose their senior subjects in Term 4 of Year 10. While there may be some who are discouraged by the excessive workload imposed by the assessment methods, most choose Mathematics, Physics and Chemistry because:

1. They like the subject or they enjoyed it in Year 10.
2. It is a prerequisite for their intended university course or it will help them in their university course.
3. Their career advisor, teacher, parents or siblings suggested they do it.
4. It will improve their OP score.
5. They like the teacher teaching the subject.
6. They have had positive input from students who are currently studying the subject.
7. They want to try it for a semester and see.
8. They like less the alternative subjects offered on that line.
9. Their friends are doing it.

However, some students do drop out of these subjects in Year 11 due to the nature of criteria based assessment and the amount of workload involved in EEI tasks.

## **The ability of assessment processes to support valid and reliable judgements of student outcomes**

The current assessment processes do not support valid and reliable judgements of student outcomes. This is because a totally school-based assessment is open to fraud and encourages cheating by teachers and students. Here are a few points to support my claim:

1. Some teachers give their students revision exam papers that are identical or very similar to the actual exam paper. Some teachers work through the exam questions, a day or two prior to the exam. These tactics are not disclosed to the panel.
2. Teaching to the exam is another strategy some teachers adopt in order to maximise their students' grades. Since it is the classroom teacher who sets and marks the exams, all a teacher needs to do to lift the class grades is to teach to the exam. The system encourages such practices.
3. The level of assistance provided to students in an exam is often not disclosed. 'Assistance' changes the conditions of the exam and is difficult for the panellists to gauge. Some teachers help students during exams. Some schools allow their students to bring with them one or two pages of 'cheat sheets' containing formulae, examples, definitions, graphs and diagrams. These sheets are not attached to the student's answer sheets when they are sent to the panel. In one case I know, two pages containing differentiation and integration formulae with worked examples were handed out during a Maths B exam and were not attached to the answer sheets when sent to the panel.
4. Almost all schools recycle a substantial percentage of their exam questions year after year. Students are able to access their exam papers after Term 1 of the following year, raising issues of future student familiarity with the assessment items provided by the school.
5. All members of the teaching staff have electronic access to assessment items stored on the network. It is impossible to know when an unauthorised copy has been made. A similar situation occurs when paper copies of exams are stored in unsecured areas accessible by all staff and in some cases by students.
6. There have also been instances where students have managed to gain access to staff drive on the school computer system and copy supposedly secure files. Staffroom break-ins and staff losing their flash drives containing exams also happen from time to time.
7. Students have been known to copy questions from the exam paper and pass them on to the following year's cohort. I know of a case where one student had managed to take photos of an exam paper using his mobile phone.

8. Students who are unable to sit an exam on the scheduled day due to being sick or being on holidays, sit the exam on their return. These students have the opportunity to find out from their fellow students what questions appeared in the exam. It is not uncommon for students to feign sickness on exam days to take advantage of this situation.
9. Inconsistency in teacher-marking and in levels of exam difficulty between schools is impossible to monitor or moderate.
10. It is naive to assume that breaches are easily detected at moderation. The fact is that these breaches are almost impossible to detect. The panel simply does not have the time, resource or in some cases the expertise to investigate all possible breaches. A panellist has 2 hours to review a school's submission and in that time the panellist needs to become familiar with the assessment instruments and then review 36 assessment items belonging to 9 students.

You will note that an assessment system based on external exam will eliminate all the above problems.

Another useful effect of an external exam system is that it exposes the incompetent teachers in our schools. For this reason alone it is worth considering external exams.

An unintended consequence of a school-based assessment is that students are made to feel they must not upset their teacher in any way, for fear of being marked down in their assessment items. They are reluctant to question the teacher on marking and even on concepts presented in class.

It is reasonable to assume that most teachers will conduct themselves in a professional and ethical manner most of the time. But it is not reasonable to assume that all teachers will conduct themselves in a professional and ethical manner all of the time, especially when their performance as a teacher is often judged by the number of VHA and HA grade students they produce in their subjects.

I keep asking myself why it is that after 40+ years of all the 'educational benefits' the moderated school-based assessment system is supposed to have brought to Queensland, the overwhelming majority of school authorities around the world are continually refusing to adopt it.

The QSA's, QTU's and the previous Labor government's ideological opposition to external exams is not only preventing us from accurately assessing student abilities, it has been continually lowering the educational standards in Queensland.

A totally school based assessment is unreliable and makes comparison of student achievement meaningless. Without some form of external assessment, we do not have a full picture of current standard of student performance or school performance.

## Recommendation

My recommendation is that

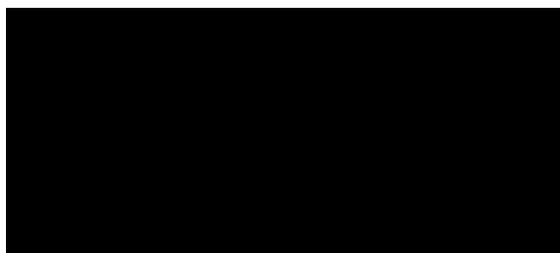
- i. We replace EEs and ERTs with classroom practicals and write ups.
- ii. We remove criteria based assessment methods.
- iii. We use marks instead of grades.
- iv. We call an exam an 'exam', and not a 'supervised assessment', as everybody knows what an exam is.
- v. We allocate weighting to assessment items as follows:
  - 60%–75% to an external exam
  - 15%–25% to class tests and
  - 10%–15% to practical write ups.

Eg. 60:25:15 split or 75:15:10 split.

Queensland teachers have been pleading with QSA and the previous state Labor government for six years a fairer assessment system in our schools. These pleas have fallen on deaf ears. The teachers, parents and students deserve something better than the worst possible assessment system in the world that we currently have. We are looking to you for help. Please help us.

I thank you for considering my submission.

Yours sincerely,

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 (Name and signature not for publication please)

1<sup>st</sup> May, 2013.