SMC&PA Submission 87
Received: 7 May 2013

Submission to the Parliamentary Inquiry into the Assessment Methods for Senior Maths, Chemistry and Physics

Dear Inquiry Members,

I am a Year 12 student who is completing, among other subjects, Maths B, Maths C, Chemistry and Physics at a state school.

I would like to request that my personal details be withheld from publication to prevent any impact on my OP result.

I would like to suggest and justify that the current system of school-based exams, extended response tasks (ERTs) and extended experimental investigations (EEIs) in chemistry and physics be overhauled and replaced with a fair and equitable system of external exams at the end of each term. Similarly, I would like to suggest that the maths system of school-based exams and alternative assessment tasks (AATs) be overhauled and replaced with external exams at the end of each term.

I have the following concerns:

1. EEIs are inequitable
2. ERTs are too specific
3. School-based exams are unfair
4. AATs do not solely assess maths

I also have the following justification for termly, unit-based external exams:

5. External exams allow fairer results
6. External exams would allow longer-term monitoring of progress

1. EEIs are inequitable

The EEI assessment method is highly inequitable, favouring students who are financially wealthy and/or have access to resources.

I am currently completing a chemistry EEI on the topic of enzymes. The school provided virtually no resources for this assessment task (three test tubes and a rubber stopper). A chemistry kit containing thermometers, safety equipment, plastic pipettes, plastic specimen jars and small quantities of basic consumables (e.g. 1M hydrochloric acid, 1M sodium hydroxide, litmus paper strips and metal samples) can be purchased from the school. No enzymes are provided in the kit – it is each student's responsibility to obtain an enzyme and the appropriate substrate. This can be a costly venture. An enzyme solution bought from a science supplier is the only option for students who want to be able to accurately regulate, and know the concentration of, the enzyme used throughout the experiment. Additionally, large amounts of substrate must be purchased.

I have recently spoken to another Year 12 student at a local private school, who is completing a chemistry EEI on the topic of winemaking. From my conversation with him, I believe that his school provided all the necessary resources for the experiment.

Upon comparison of these two school's levels of resource contribution, it appears that students at schools with few resources and/or those who cannot purchase additional material are at a severe disadvantage when performing an EEI, regardless of academic merit.

The EEI system seems to assess wealth and access to resources, rather than academic knowledge, to determine students' marks. By replacing EEIs with termly, unit-based external exams, resource limitations would have a minimal impact on students' results.

2. ERTs are too specific

Although ERTs provide students with the opportunity to gain a detailed knowledge about a specific scientific concept, this specialised knowledge is soon lost. For a Year 11 ERT late last year, I evaluated whether cellulose could replace Kevlar in bulletproof vests. I achieved very highly in the ERT, but now cannot remember any of my analysis in the report. Termly, unit-based external exams would assess general knowledge that would be remembered for a longer period of time and which could be applied to a far broader range of situations.

3. School-based exams are unfair

In my experience, the revision for science and maths exams is often related to the learning outcomes of each exam and does not focus exclusively on learning the specific types of questions on the exam. I believe that this is how revision should be completed so that students understand all the content covered in the unit.

However, I have spoken to a student from a private school who said that her Maths C revision was a practice test that was essentially the same as the actual exam, but with the numbers changed. She said that the students often learnt how to do those selected types of problems as revision for the exam.

This form of assistance given to the students by the teacher is obviously unfair, compared to the very general, topic-based revision that I received. External exams will be fairer to students across the state. Although teachers could, as many have with NAPLAN and QCS, teach the style of questions on those exams, the content remains unknown. The guesses of all teachers as to what would be on the exam would be equally uninformed, so the situation of the teachers changing the numbers for the revision could never occur. Therefore, students would still need to know all the content of the unit to achieve highly in the exam.

4. AATs do not solely assess maths

AATs now seem to assess writing skills as much as mathematical skills. Although I do not fault the AAT system, the questions in such tasks now ask for quite lengthy prose explanations of assumptions. Maths AATs should assess more mathematical reasoning and justification, and fewer prose explanations of assumptions.

5. External exams allow fairer results

I have recently spoken to another Year 12 student (who attends a private school) who said that most students in her (unspecified) class achieved A+ results on their end of term assessment pieces in Term 1 this year. With the assistance my Maths class received (see Point 3), only a handful (if that many) achieved an A result. It seems unlikely that the majority of students in a cohort, unassisted in a fair exam, would achieve as highly as has been described. Termly external exams would allow all students to receive a comparable mark, regardless of which school they attended.

In addition, the current system of criteria sheets is too ambiguous to allow consistent marking. When I asked my Physics teacher to explain the criteria for an ERT, he was unable to clearly explain what was required to achieve each standard. Instead, an external exam with a numerical marking system allows clear distinctions to be made between grades and is easier for students to understand. For example, in Maths, it is clearly stated that half a mark is always deducted if a small error in the working causes the final answer to be incorrect, despite all the working being correct. Further, concrete cutoff scores (e.g. ≥85% is an A, etc.) allow all students to unambiguously understand how to achieve well.

6. External exams would allow longer-term monitoring of progress

Some senior subjects use assessment task results from both Year 11 and 12 to determine exit levels of achievement, while others appear to use only Year 12 assessment results. The use of only Year 12 results in some subjects places additional pressure on all Year 12 assessment pieces and could encourage students to be more apathetic towards Year 11 assessment tasks. If one equally weighted external exam for each of Maths B, Maths C, Physics and Chemistry was conducted at the end of each term in both Years 11 and 12 (a total of 8 exams, each weighing one-eighth of the total result), then the exams would apply an equal amount of pressure on students throughout their senior schooling, rather than just in Year 12. This allows short-term, unexpected interruptions to a student's academic performance to have minimal effect on his/her result.

Please note that I do *not* support a HSC style, high pressure, one-chance exam at the end of Year 12.

Yours sincerely,