

Assessment Methods for Senior Maths, Chemistry and Physics

I am writing this in a desperate attempt that assessment procedures will change and the next generation of teachers will be able to fully focus their energy on things that actually improve student learning and outcomes (things like preparing lessons!).

A bit about myself

I have been a Maths / Science teacher in Queensland schools for 35 years. Presently I teach Mathematics B and I am on the Mathematics B panel. In the past, I have taught Physics was on the Physics panel. (I moved away from Physics and resigned from the Physics' panel when the new assessment system of E.E.I's etc. was being introduced.). I love teaching and after 35 years I am enjoying it more than ever.

The destructive nature and chaos of the present assessment system

One of the greatest time wasters, sappers of energy and reasons why good teachers have gone on stress leave, had nervous break downs or resigned has been the writing of and implementation of vague, unnecessarily complicated, non-transparent and hard to repeat assessment regimes using wordy criteria sheets.

How do I rank a student in year 12 mathematics B at the moment?

1. GRADE ON A FIVE POINT SCALE

I mark exams and assignments that grades each question from A to D. This grading of each question using letters adds a level of unnecessary complexity as a 'C' on a 'C' level question is full marks whereas a 'C' on an 'A' level question is like a pass. So a 'C' does not always mean the same thing! I then translate their letter grades into marks and then translate back to an overall letter grade in the three areas of Knowledge and Procedures, Modelling and Problem Solving. I also grade for Communication.

Now initially the Q.S.A. said you definitely **can't** use marks. But as many schools were forced to use marks to try and get some sort of reliability with their student rankings the 'word' now comes down in Maths B panel meetings; "Schools **can** use marks ... this is fine ... you just can't put them on papers!" This is typical of the Q.S.A. ... come up with a system that doesn't really work and let **each school** in the state struggle and stain in trying to implement it. The very high level of frustration and stress and the countless hours totally wasted in doing this is beyond counting.

2. GRADE ON A FIFTY POINT SCALE

I then combine all the student's assessment items by translating letter grades back to marks and then back to a fifty point scale from Very Low Achievement 1 to Very High Achievement 10. I use a combination of marks, making sure the student fits the criteria and sometimes (but not always) things like the trend of scores or sometimes (but not always) things using the latest scores as being more important than earlier scores. It's a complicated world isn't it?

3. GRADE ON A 200 POINT SCALE (200 TO 400 (S.A.I.))

Then the score is translated from this fifty point scale to a 200 point scale in which 200 is the bottom student in the Maths cohort and 400 is the highest student.

If the above process seems confusing it is because it is confusing! If I had an hour or so with you I might be able to clarify the process.

A vague, complicated, non-transparent and hard to repeat assessment system

The assessment process is hard to repeat. In the above process, the teacher is forced to make numerous 'professional judgements'. (Because of the clumsiness and vagueness of the assessment regime, 'professional judgement' can sometimes be no more than a 'guess from a professional'.) Because there are no marks on exam papers, teachers can be forced to swap forwards and backwards between marks and letters. So if the procedure was completed sometime later, you could very well (I would say almost certainly) end up with a different S.A.I. score!

Ranking students should be transparent and thus repeatable. The way an S.A.I. is obtained should be able to be easily understood by students and parents. Well, teachers struggle their way through the process and therefore it is very difficult to explain to students and for parents the system would be almost a total mystery.

How does the panel review a student's script?

I am on the Mathematics B panel. We are told NOT to consider marks or do any adding of scores. (Schools are told not to send student profiles with marks.) We are encouraged to read the student's scripts and from this get a 'feeling' of the overall grade. Much more could be said about the panel process and panel training but I will move on.

THE ABOVE PROCESS IS SIMPLY NOT GOOD ENOUGH (FAIR, EQUITABLE OR TRANSPARENT) WHEN THE S.A.I. SCORE AFFECTS THE STUDENT'S WHOLE LIFE WITH REGARDS TO THE COURSES THEY CAN OR CAN NOT APPLY FOR.

1. TEACHERS WANT TO USE PERCENTAGES AND NUMBERS ON EXAMS

Teachers want to have exam papers that have a good range of questions (simple to complex) with marks on each question and then use marks and percentages to rank the students. You can add up marks (that's what numbers were designed for!) but you can't add up letters (unless of course, as we are virtually forced to do, treat each letter grade as equally weighted and assign a mark to a letter – A is 5, B is 4 etc.) **We also need do away with non-transparent wordy criteria sheets!**

2. TEACHERS DON'T WANT TO HAVE TO 'RE-INVENT THE WHEEL' EVERYTIME

Schools have been told 'every school is different' so go and write your own work programs, exams with vague and non-transparent assessment schemes. Teachers from each school in the state then develop exam papers and a way to calculate an overall grade from the vague guidelines supplied by Q.S.A. It is quite possible the Q.S.A. then says "that's not what we want! Do it again!" and the process is repeated again and again (and again).

3. TEACHERS WANT TO BE FREE (AND STILL HAVE SOME ENERGY LEFT) TO DO THEIR JOB!

The Q.S.A. should be supplying teachers with a range of completed work programs, a variety of high quality assessment items (of the type as I mentioned in point 1) and very clear guidelines for assigning ratings using **MARKS**. Instead each school in the state is trying to work out these things from vague guidelines. It is so inefficient that if education was a business it would not have lasted one month. But somehow this inefficiently in education has goes on unchecked decade after decade.

Instead of being worn out by ineffective assessment regimes, teachers would like to have time and energy to fully concentrate on preparing for class, following up and improving their student's understanding, writing report cards, ringing parents, following on behavioural issues, doing playground duty, keeping up to date with their subject material and maybe even running a lunch time activity.

WHAT IS THE Q.S.A.'S TYPICAL RESPONSE WHEN PROBLEMS ARE HIGHLIGHTED?

These assessment problems as outlined above have been raised at meetings run by the Q.S.A. over a long period.

Q.S.A. Defence 1: *'Teachers are resistant to this system because they don't like change.'*

Well, I (along with the teachers I know) are very happy to work hard implementing a system if it allows us to sleep at night knowing we have confidence in the ranking of our students. **BUT WE ARE NOT HAPPY WITH** spending endless, mind numbing and energy sapping debates on panels and in the staffroom and still **NOT** be able to fully sleep at night because we are not confident we have rated students correctly

Q.S.A. Defence 2: *'This system of criteria using letters is a great (world's best) practice.'*

Well, what teachers know about is **practice!** We are in the front line in which we rank students each day, justifying rankings to students, the Administration and parents. So put simply, **this system can't be world's best practice because it is NOT working IN PRACTICE!**

THE PRESENT ASSESSMENT REGIMES LEAD TO A DECREASE IN STANDARDS

1. *Heavy use of and equal weighting of assignments*

When it comes to September and the crucial ranking of students is carried out, my Maths B students have completed three exams and three assignments. Let's say for these items a student's overall scores were A, D, B, B, C and E. Now what is this student's overall score? Well this student may get an overall 'C' (sound achievement or a pass) for Maths B. Now the student received a C, D and an E for their exams which they did by themselves with no help whereas they received an A and two B's for their assignments which they did in their own time, received help from their teacher and possibly their tutor at home. Because we are asked to weight assignments and exams the same, a student who has limited ability in Maths B can get 'over the line' and get a C.

2. *The movement away from rote learning*

Maths B students cannot be given formulae sheets. But Maths A students, Physics and Chemistry students can be given formulae sheets.

If I was to ask my year 11 Maths B class; "What is the formula for the area of a circle?" Some know the formula; some are fairly sure it is $\pi \times \text{radius squared}$; some think it might be $\pi \times \text{radius squared}$; some get it confused with the perimeter of a circle formula and some are very vague about what the formula is. How is it that the brighter 16 year old students doing Maths B cannot **all** confidently tell me the area of a circle formula? It is because the educational system has totally underplayed the importance of rote learning over many decades. This has been (in my view) a complete disaster. Because students are not typically asked to rote learn, the teacher may have to re-visit the basic facts each time they go to try and build on a particular topic.

Many teachers would like to put in a submission but doubtless they are writing a wordy criteria sheet for term 2 or as I am, trying to work through the fog of allocating levels of achievement for term 1. We are all hoping that the parent who wants to have a real close look at how we allocate our grades doesn't ring and want an interview!

Much, much more can be said to clarify these issues so PLEASE contact me by phone if you would like any more information.

Sincerely,

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