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

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Queensland science teachers have identified the lack of support from education authorities as the major issue in senior Chemistry and Physics assessment.

This submission by the Science Teachers' Association of Queensland (STAQ) reports on a survey of Queensland teachers made during the first three weeks of April 2013. The key findings of the survey are that:

- Support for the assessment processes is mixed, with two large groups (about 40% each), one supportive and the other not supportive of the current assessment practices. A third small group (about 20%) offered limited support.
- The two main groups also offered opposing opinions about the validity and reliability of the assessment processes.
- The 68 heads of department (HODs) who responded to the survey support the current assessment system more strongly than the rest of the respondents, indicating stronger support amongst senior experienced teachers.
- All groups strongly agreed that there is a lack of support from the Queensland education authorities for the implementation of assessment processes.

The survey involved 220 teachers, both members of the Science Teachers' Association of Queensland and non-members. The survey was advertised publicly on the STAQ website and on social media. Participants responded to 12 questions framed as position statements on aspects of current assessment practice using a 5-point Likert scale. At the end of the survey teachers were invited to add their own comments.

This report is a reflection of the survey conducted by STAQ and does not necessarily reflect the opinions of the STAQ Executive and Council.

Setting

The new syllabuses marked a major change in approach to teaching the subjects and were implemented after a long period of development that included two successive trials by volunteer schools. The result was that a significant group of schools and teachers implemented the syllabuses on the basis of up to six years of practice, but the majority of schools had to implement the syllabuses without comparable support.

This Inquiry, and the survey, come relatively early in the expected life of the new syllabuses. Both Chemistry and Physics syllabuses were published in 2007 and implemented during the following three years so that a significant number of schools graduated their first year 12 students at the end of 2010. This means that many schools are still developing resources for the different types of assessments and teachers are still developing their strategies for implementing them.

Responses to the Items on the STAQ Survey

	HODs* (%)	All* (%)
Professional Support		
More support is required from professional bodies for teachers to deliver assessment and make judgments on student work.	90	95
There is adequate support from professional bodies for teachers to deliver assessment and make judgments on student work.	37	30
Queensland Assessment Tasks		
The use of written tasks (supervised) as currently prescribed by QSA, is a valuable assessment instrument that allows all students to demonstrate their learning.	94	84
The Extended Experimental Investigation is a valuable assessment instrument that allows all students to demonstrate their learning according to syllabus standards.	68	53
The Extended Response Task is a valuable assessment instrument that allows all students to demonstrate their learning according to syllabus standards.	57	49
Assessment Method		
School-based assessment is more valid than external examination.	63	55
The use of external exams would allow students to demonstrate their learning within the full range of syllabus standards.	59	71
Criteria-based marking allows for valid and reliable judgments of student outcomes and levels of achievement.	59	47
Quantitative marks-based assessment allows for valid and reliable judgments of student outcomes and levels of achievement.	53	67
Current Practice		
I support the continued use of the senior science assessment processes that are currently in place in Queensland schools	51	40
Assessment practices as they are currently enacted encourage student participation in chemistry and physics courses.	50	43

* The results report the level of support for each statement by aggregating the strongly agree, agree and neutral responses and by implication the level of disagreement.

Comments

Most of the participants in the survey appended comments to their responses and took the opportunity to provide more focused insights from their current experiences.

- The greatest number of comments, by far, targeted a lack of clarity around assessment criteria and standards together with comments about the inconsistency of decisions and advice from the panels.

- The second largest set of comments targeted the perceived excessively large "size" of extended experimental investigations and extended response tasks. These were felt to require reports from students that were too long and unnecessarily onerous for teachers to assess.
- A group of comments called for a change from school-based assessment to a system similar to the mixed external exam and school-based model of assessment found in New South Wales and Victoria.
- A collection of individual comments supported the current assessment system: pointing out that the system made it possible to tailor courses to suit the needs of individual schools and suggested that the State has a "good workable system".
- Another small collection of comments suggested the current assessment system in chemistry and physics is open to manipulation by teachers, schools and panels and that it was not possible to establish the originality of extended experimental investigations and extended response tasks.

An Interpretation

The results of the current survey lead the Science Teachers Association of Queensland to suggest the following interpretation:

The group that strongly supports the current system is based around the cohort that participated in the extensive curriculum trials (and thus received much greater support and professional development) and who, together with other senior teachers have developed the skills and expertise to work with the syllabuses and assessment methods and mentor teachers coming into the system.

The other large group is represented by teachers who have not embraced the new curricula, do not have access to the professional learning that would help them master the changes, and often reflect on their past success with earlier curricula.

The third, smaller group of teachers, who are ambivalent about the system, also lack access to the professional learning they require, but can see some of the potential advantages of the system.

This interpretation can be extended to the individual items in the survey:

Support: The strength of the primary conclusion from the survey: that teachers need more support if they are to be expected to do justice to the assessment of the chemistry and physics syllabuses, comes from the near unanimous responses from all three groups of teachers. This is somewhat surprising given the international interest Queensland assessment methods have generated because they require teachers to introduce students to investigative methods with a strong focus on students taking measures of responsibility for their learning (Darling-Hammond & McCloskey, 2008). At the same time the teaching strategies that lead students to these goals are and recognized as good measures of teaching expertise as indicated in the Australian Professional Standards for Teachers (*Australian Professional Standards for Teachers*, 2012) .

Written tasks: The Written Task mandated in the syllabuses also received bipartisan support from the different groups. In part, this is because the task involves supervised assessment and can take the form of traditional exams, but it can also allow teachers to create other pieces of assessment that provide students with greater scope to demonstrate their learning. In the survey, the HODs, favour the written tasks more than the whole group. A reasonable conclusion is that they have both the position and experience to make use of the flexibility of the tasks.

Extended Experimental Investigations: The EEIs are similarly appreciated more by the HODs than the whole group, probably for the same reason. The level of support was generally lower than for written task because of the criticism of the overly long and onerous nature of many of the current EEIs. These tasks can be very successful and in discussion, experienced teachers often

say that they are the best pieces of assessment for chemistry and physics because they can give students the opportunity to show a depth of knowledge and skill in application that is impossible in the examination setting. However the level of resources available, particularly for beginning teachers and those new to the syllabuses is minimal. This is one of the major areas in which support is urgently needed.

Extended Response Tasks: The ERT is valued less that the EEI. Its heritage is based in the traditional "assignment" that was used in earlier syllabuses in chemistry and physics. However it is not mandated in the assessment portfolio and probably for that reason has received even less attention than the other assessment types. The higher agreement about the value of the ERT by HODs than by the whole group is probably another example of the greater experience making the assessment type easier and less arduous to use.

Assessment Methods: The four questions about the assessment methods loosely covering criterion based versus norm-referenced assessment and school-based assessment versus external examination gave inconclusive results. The reason is apparent in the comments teachers provided. While there were a considerable number of comments that supported the current system, there was deep concern about the lack of consistency in advice through the panel system. This combined with a lack of common understanding around criteria make assessment an onerous task. The result is over assessment that exacerbates the problem and makes external examinations an attractive option. This is one of the areas in which greater support from the education authorities, through mentoring and better resources, would have a major influence, increasing the quality of assessments and reducing the criticisms leveled at the system both by teachers, and outsiders.

Current Practice: The two questions that examined quite different aspects of current practice also gave inconclusive results. Overall support for and against the current suite of assessment tasks in Queensland is not significantly different and is in line with the rest of the results of the survey. Likewise, the other question shows that as many teachers believe the assessment types discourage as encourage student participation in further chemistry and physics. This is a deeply disappointing result because one of the reasons for implementing these assessment tasks is to involve students in the pursuit of scientific knowledge and the fascination of scientific investigations.

In Summary

There is support from teachers for current assessment practices in Chemistry and Physics, and the support is stronger amongst experienced teachers (such as HODs). This is a reflection of the level of experience and expertise of the teachers. In Queensland senior teachers are more intimately involved with the syllabus and assessment tasks and are more likely to have had panel exposure which also assists in developing a deeper understanding and appreciation of the tasks and the requirements of student.

The lack of adequate professional development, resourcing and time has led to an unacceptable level of teacher dissatisfaction with current assessment practices in Chemistry and Physics. It is recommended that senior science teachers be provided with opportunities to develop their professional skills and access resources required to meet the demands of Queensland's current assessment practices.

References

Australian Professional Standards for Teachers. (2012). Australian Institute for Teaching and School Leadership, Retrieved from http://www.teacherstandards.aitsl.edu.au/Standards/AllStandards.

Darling-Hammond, L., & McCloskey, L. (2008). Assessment for learning around the world: What would it mean to be internationally competitive. *Phi Delta Kappan, 90*(4), 263-272.