

QUEENSLAND GOVERNMENT RESPONSE

Education and Innovation Committee Report No. 25: The assessment methods used in senior mathematics, chemistry and physics in Queensland schools

On 14 February 2013, the Parliament asked the Education and Innovation Committee to inquire into and report on the assessment methods used in Senior Mathematics, Chemistry and Physics in Queensland schools.

In undertaking this inquiry, the committee was asked to consider the following issues:

- ensuring assessment processes are supported by teachers;
- student participation levels; and
- the ability of assessment processes to support valid and reliable judgments of student outcomes.

The committee concluded that while participation levels have decreased in senior mathematics and science subjects with the exception of Mathematics C, there was no suggestion that this is because of senior assessment methods. Accordingly, the committee did not make any recommendations concerning the question of participation.

In its report, the committee has made 16 recommendations relating to five topics:

- A. Inquiry-based assessment tasks (Recommendations 1, 7, 8, 9, 10 & 12)
- B. Standards and numerical marking (Recommendations 6 & 13)
- C. Additional support for teachers (Recommendations 3, 11 & 15)
- D. Further research (Recommendations 5 & 16)
- E. External exams, scaling and moderation (Recommendations 2, 4 & 14)

The Government Response to the recommendations is outlined below under these five sections.

CONTEXT

The Government is mindful that the recommendations of the committee have implications for a number of reforms already underway that are related to senior secondary school curriculum and assessment. In addition, implementation of the recommendations has the potential to impact on the current practices of many schools.

Review of senior assessment and reporting, and tertiary entrance

On 30 July 2013, the Minister for Education, Training and Employment launched an independent review into Queensland's senior assessment and tertiary entrance systems. The educational landscape has changed significantly since the Overall Position (OP) tertiary entrance system was introduced in 1992, with senior students using a growing range of pathways to reach their tertiary and post-schooling destinations. The review will help to ensure Queensland's senior assessment and tertiary entrance processes continue to provide school leavers with fair and comprehensive recognition of their academic achievements.

The review is being conducted by the Australian Council for Educational Research (ACER), who will report to the Minister by 31 July 2014.

The terms of reference regarding senior secondary school assessment and reporting ask the reviewer to consider:

- comparability across schools of student standards of achievement in the same subject, including review and moderation processes;
- the appropriateness, validity and reliability of various types of assessment instruments used for senior secondary school subjects;
- the adequacy of the current exit levels of achievement;
- the form and content of reports to students and parents, including the Senior Education Profile; and
- implications of the Australian Curriculum for the Queensland model.

The terms of reference also require the review to take account of issues and findings from previous reviews. This includes the committee's inquiry and report.

(The complete terms of reference can be found at <http://deta.qld.gov.au/about/government-responses/senior-assessment-review-tor.html>.)

Queensland Curriculum and Assessment Authority

From 1 July 2014, a new statutory body, the Queensland Curriculum and Assessment Authority (QCAA), is proposed to take responsibility for school curriculum and assessment in Queensland. The QCAA would replace the Queensland Studies Authority (QSA).

The Minister introduced the Education (Queensland Curriculum and Assessment Authority) 2013 Bill in the Legislative Assembly on 29 October 2013, with parliament expected to debate the Bill in early 2014. The Bill provides a contemporary legislative framework with strong corporate governance arrangements and clear syllabus functions that reflect the implementation of the Australian Curriculum.

The Bill enables the Minister to issue a statement of expectations to the QCAA, setting out the Minister's expectations for the QCAA's performance of its functions.

All references to actions to be taken by the QSA in the Government Response include the QCAA after 1 July 2014, pending the passage and assent of the Bill.

Australian Curriculum

Along with all other Australian states and territories, Queensland has committed to implement the Australian Curriculum.

Senior secondary subjects have been developed by the Australian Curriculum Assessment and Reporting Authority (ACARA) across English, History, Mathematics and Science. The four science subjects include Physics and Chemistry. This curriculum was endorsed by Ministers of Education as the agreed common base for future state and territory senior secondary courses.

The Australian Curriculum for each senior secondary subject specifies curriculum content and achievement standards. The states and territories will determine assessment in their own systems, but assessment will have to reflect the national achievement standards.

The content and achievement standards for the Australian Curriculum Physics and Chemistry subjects are organised differently from the general objectives and exit criteria currently used in Queensland syllabuses. They will require a redevelopment of Queensland senior syllabus documents.

Schools offering senior mathematics and science

About 400 schools enrol students in senior sciences and mathematics subjects. These schools are implementing established work programs that they have developed and that have been approved by the QSA.

As a result, changes to syllabuses or to assessment practices in senior mathematics and sciences have the potential to affect these schools and require changes to some 2,000 or more work programs.

School autonomy

The Queensland Government strongly supports the autonomy of schools to make their own decisions about what will generate educational success for their students.

International evidence from the Programme for International Student Assessment (PISA) indicates autonomy with respect to curriculum and assessment is the form of autonomy that has the most powerful effect on student outcomes.¹

Secondary schools have to design their assessment program within the framework of state-wide syllabuses. However, Queensland syllabuses leave many decisions about the type of assessments, their number, timing and conditions, to schools. The Government supports schools making these choices.

The Government also notes that some of the issues raised before the inquiry relate to decisions that are made at school level, and that are not mandated by the syllabuses or determined by the QSA. However, the Government acknowledges that there is some confusion within schools around what can be made at a school level and what is mandated by the QSA in some areas covered by the inquiry.

PRINCIPLES

In all its responses to the committee's recommendations, the Government seeks to:

- respect the findings of the committee, and the testimony of those who made submissions to the inquiry.
- synchronise changes arising from the committee's recommendations with the ongoing reform agenda, and avoid imposing additional workloads on schools by mandating changes that may be short-lived and have to be re-worked with the outcomes of the review of senior assessment and tertiary entrance or the implementation of the senior Australian Curriculum.
- preserve and enhance school autonomy and responsibility regarding curriculum and assessment, and minimise externally mandated changes to work programs that schools believe are successful
- give due regard to the legislative framework for school curriculum in Queensland, and the statutory functions and powers of the QSA or, pending the assent of Parliament and Executive Council, the QCAA.

¹ OECD 2011 *PISA in Focus: School autonomy and accountability: Are they related to student performance?*
<http://www.oecd.org/pisa/48910490.pdf>

OVERARCHING ACTIONS

The Queensland Government response addresses separately each of the committee's recommendations below. In addition, the Government commits to the following overarching actions, which comprise a common response to the findings of the inquiry and the committee's recommendations under sections A, B and C below.

1. The Minister for Education, Training and Employment will request the Queensland Studies Authority (QSA) to consider submissions to the inquiry, identify major misunderstandings which impact on school practice, and publish clarifications to assist schools to improve their practice or correct perceptions.
2. The Minister will request the QSA to convene state-wide workshops in early 2014 for the Heads of Department (HODs) in the senior sciences, especially Physics and Chemistry, in all secondary schools.

The workshops will address challenges and confusions identified by the commission inquiry. They will include the following topics:

- Methods for recording student achievement on assessment items, and of collating these results to reflect exit criteria and derive exit levels of achievement.
- Design, management and assessment of inquiry-based assessment tasks. This would clarify the purpose of inquiry-based tasks and their appropriate contribution to exit criteria. It would include examples of well-designed tasks, practical strategies for realistic time management (including word limits), and assessment techniques that allow reasonable marking time and teacher workload.
- Strategies for the authentication of student work, including monitoring in class time and the use of questioning. These strategies would especially apply to inquiry-based assessments completed partly outside class time.

The QSA may involve HODs themselves in sharing successful practices or working through implementation problems.

3. The Minister will direct Education Queensland to ensure that state school senior science HODs attend the workshops.
4. The Minister will refer Recommendations 2, 4, 9 and 14 to the independent review of senior assessment and tertiary entrance. Some aspects of Recommendations 6, 7 and 13 will also be referred for the consideration of the review, though other immediate actions will also be taken in response to these recommendations.

RESPONSE TO SPECIFIC RECOMMENDATIONS

A. INQUIRY-BASED ASSESSMENT TASKS

The Queensland Government concurs with the committee's finding that inquiry-based assessment tasks are fundamental to the nature of science and mathematics. In a similar vein, the Chief Scientist for

Australia has stated that “inquiry-based learning should be emphasised, along with the teaching of critical thinking and the scientific method”².

At the same time, the committee has found there are reasonable concerns regarding the levels of outside support that students may receive in completing inquiry-based assessment tasks. The report also highlights testimony from some teachers and students regarding the impact of workloads associated with some forms of inquiry-based assessment, notably Extended Experimental Investigations (EEIs).

In light of these concerns, the committee has proposed a number of measures intended to:

- reduce the contribution of inquiry-based tasks to a student’s overall achievement;
- limit student and teacher workloads; and
- provide greater assurance that inquiry-based tasks are the result of a student’s own work.

Recommendation 1

The committee recommends that schools should retain the ability to determine the timing and nature of summative assessment tasks, with the syllabus specifying an upper limit on the number of extended assignment tasks; and a reduced contribution by inquiry-based tasks to a student’s overall achievement grade (see also Recommendation 9).

Government Response: **Support**

The Government agrees that schools should continue to have flexibility in determining the timing and nature of summative assessment tasks within the framework of Queensland syllabuses. As noted above, the evidence demonstrates that the relationship between school autonomy and improved learning outcomes is strongest where schools are able to align curriculum and assessment practices with the needs of their students.

The Government endorses the value of inquiry-based assessment, and accepts that this type of assessment is integrated with the curriculum content and general objectives of senior science courses. The current syllabuses for Physics and Chemistry have as their general objectives:

- Knowledge and conceptual understanding;
- Investigative processes; and
- Evaluating and concluding.

The Government does not contest these objectives, or the statutory role of the QSA to determine the objectives of senior school subjects and the assessment instruments that measure students’ achievement of them. School work programs must include assessment tasks that give students sufficient opportunity to demonstrate all the objectives, and for teachers to adequately assess all of them.

The Government also recognises that in practice assessment must require a reasonable workload for the student in completing it and the teacher in marking it. The Government acknowledges the concerns about this expressed in the inquiry.

However, it should be recognised that Chemistry and Physics syllabuses mandate the use of just one EEI in a folio of four to six assessment tasks. Similarly, the syllabuses specify that the written discussion in

² Office of the Chief Scientist 2013 *Science, Technology, Engineering and Mathematics in the National Interest: A Position Paper*
<http://www.chiefscientist.gov.au/wp-content/uploads/STEMstrategy2907FINALweb.pdf>

an EEI included in the folio should be 1,000 to 1,500 words in length. Reported practices that impose heavy workloads often go beyond syllabus requirements and appear to originate at school level.

Accordingly, the Government will require state schools to review their senior mathematics and science assessment workloads, and will encourage all schools to consider their assessment practices.

The committee has recommended that the number of extended assignment tasks be limited in the syllabus, and that the contribution of inquiry-based tasks to overall results be reduced. These will be dealt with under Recommendations 8 and 9 below.

Action

5. The Minister will direct Education Queensland to ensure all state schools review their assessment loads in senior mathematics and science, especially with respect to the number, timing and scale of EEIs.

Recommendation 8

That inquiry-based assessment tasks be mandated at no more than one in each of year 11 and 12 (with schools free to use a maximum of two).

Government Response: **Support**

As acknowledged in the committee report, inquiry-based assessment tasks are recognised as being particularly effective in the assessment of syllabus criteria relating to “higher order” skills. The Government believes that students must be provided with a fair chance to demonstrate achievement against these skills, and to meet all the syllabus criteria.

Concerns expressed to the committee appear to have focused most on EEIs, in which students are required to identify and collect primary or secondary data for analysis and evaluation.

While appropriate flexibility is supported, the Government accepts the introduction of an appropriate upper limit on the use of EEIs. Given the significant workload that is typically associated with these tasks, the Government supports a maximum limit of two EEIs per subject, per year. The use of up to two EEIs should provide schools with sufficient flexibility to develop assessment programs that allow students to demonstrate achievement against all of the syllabus criteria.

Actions

6. The Minister will request the QSA to publicise the preferred approach of no more than two EEIs per year, and include it in state-wide workshops for senior science HODs during 2014.
7. The Minister will approve the QSA formally amending syllabuses to require that no more than two EEIs be conducted per subject, per year, as part of implementation of the Australian Curriculum.

Recommendation 9

That inquiry-based assessment tasks contribute to a defined proportion of a student’s overall mark for that subject (a minimum of 12.5% and a maximum of 25%).

Government Response: **Support further consideration**

The committee recommends that the contribution of inquiry-based tasks to a student's overall achievement grade be reduced.

As acknowledged in the committee report, syllabuses already set a relatively low minimum threshold in terms of the contribution of inquiry-based assessment tasks:

- Chemistry and Physics syllabuses mandate the use of one inquiry-based EEI, covering all three syllabus criteria, in a folio of four to six summative assessment tasks.
- Mathematic syllabuses mandate the inclusion of two inquiry-based tasks (an extended modelling and problem-solving task, a report, or a similar task), contributing "significantly" to decision-making on all three syllabus criteria, each year.

Syllabuses provide a range of principles that schools must apply when using assessment tasks to make judgements of student achievement. However, this does not include numerical weighting, or any other specific method, for determining the respective contribution of individual assessment tasks. This is left to schools to determine.

The Government believes further consideration should be given before directing schools to reduce the contribution of inquiry-based assessment to a student's overall achievement and to adopt a specific means for gauging the relative contributions of items of assessment. However, as an interim measure teachers could be advised that EEIs should play a limited role in determining exit levels of achievement. The terms of reference for the independent review of senior assessment and tertiary entrance ask the review to consider "the appropriateness, validity and reliability of various types of assessment instruments used for senior secondary school subjects". This work will support further consideration of the contribution that should be afforded to particular assessment tasks, and how this contribution may be appropriately defined as part of senior assessment requirements.

Action

8. The Minister will request the QSA to publicise that EEIs should play a limited role in a student's exit levels of achievement, and include it in state-wide workshops for senior science HODs during 2014.
9. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 9 in accordance with its terms of reference.

Recommendation 10

That inquiry-based assessment tasks can be presented in a range of formats, including oral presentations, visual presentations as well as in a written report format.

Government Response: **Support**

The report suggests that the use of formats other than written reports may assist in managing assessment workloads, and may provide a more inclusive assessment model that meets the needs of particular student cohorts, e.g. students for whom English is a second language. Some submissions to the inquiry complained about an emphasis on "literary" ability in written assessment that is excessive in mathematics and science subjects.

The Government supports this recommendation and endorses the current inclusion in Physics and Chemistry syllabuses of the general objective *Evaluating and concluding*, and the goal that students "communicate information in a variety of ways". It is essential for students to be able to use language

and conventions appropriate to the discipline area. At the same time it is valid that they be given a range of means to convey their grasp of the subject.

Some inquiry-based assessment tasks outlined in the Physics, Chemistry and senior mathematics syllabuses may already be completed in a range of formats. These include:

- Extended response tasks in Physics and Chemistry, which may be completed as spoken or multi-modal presentations of 5-7 minutes duration.
- Extended modelling and problem solving tasks in mathematics, which may be reported through data tables, graphs and diagrams.

Extended experimental investigations (EELs) are currently an exception to this general approach. Chemistry and Physics syllabuses require EELs to be completed as a written report with up to 1,500 words of discussion, conclusions, evaluation and recommendations.

The Government supports the adoption of a more flexible approach, in which schools have the flexibility to enable EELs to be presented, either in whole or in part, in a non-written format such as an oral or multimedia presentation.

With the assistance of the QSA, schools should clearly define what qualities of written communication are relevant to syllabus objectives such as *Evaluating and concluding* and *Communication and justification*, in the context of mathematics and the sciences.

Action

10. The Minister will request the QSA to amend senior chemistry and physics syllabuses to enable EELs to be completed, either in whole or in part, in a non-written format

Recommendation 7

The committee recommends that the syllabus prescribe that inquiry-based assessment tasks such as extended modelling, extended experimental investigations and extended research tasks, be completed in class time under teacher supervision, and that it specify a maximum number of hours that can be spent on these tasks.

Government Response: **Support in-principle**

Some of those who made submissions to the inquiry expressed concerns about guaranteeing the authenticity of assignments that are completed outside school hours – i.e., evidence that the assessment piece has been completed by the students themselves.

Recommendations 7 and 12 reflect the committee’s desire for greater assurance of authenticity, in particular regarding inquiry-based assessment tasks. The Government acknowledges the concerns expressed, and that this question extends beyond the scope of science and mathematics subjects, to any assessment that has an out-of-class component.

Current syllabus documents include a general requirement that teachers must implement strategies to ensure the authentication of student work. For example, the Physics syllabus requires that “Teachers must allow some class time and provide some supervision at times for students to be able to effectively undertake each component of the experimental investigation” (p 22).

Syllabuses also link to *Strategies for authenticating student work for learning and assessment*³. These strategies include a suggestion that teachers:

“Ensure that a significant amount of classroom time is spent on the task so that the teacher is familiar with each student’s work in progress and can regularly monitor and discuss aspects of the work with students.”

The Government has confidence in schools’ ability to exercise professional judgement in the selection of strategies to ensure the authenticity of student work. The QSA will be requested to provide schools with additional advice and support in this area, as identified under Recommendation 12 below.

The Government also considers that it is desirable for schools and teachers to continue to retain some flexibility in allowing a proportion of extended assignment work to be undertaken outside the classroom. The independent completion of some assessment work outside classroom supervision is a reasonable expectation at senior level, and provides preparation for tertiary studies.

The use of a prescribed time limit for inquiry-based assessment tasks is unlikely to be practical if students are not entirely restricted to completing tasks in class time. The Government believes that the design and management of assessment tasks are a critical responsibility of schools, and that schools should ensure their teaching staff are sensitive to risks and skilled in addressing them.

However, the Government sees this recommendation falling within the terms of reference for the independent review of senior assessment and tertiary entrance.

The terms of reference require the reviewer to take account of assessment models employed in other states and territories. The Government notes that other jurisdictions do have requirements around school based assessments and teacher supervision, notably Victoria’s school assessed coursework tasks (SACs) which are written by the school and must be done primarily in class time.

Actions

11. The Minister will request the QSA to address the time implications of extended inquiry-based assessments, and appropriate strategies for assessment design and time management, as part of state-wide workshops for senior science HODs during 2014.
12. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 7 in accordance with its terms of reference.

Recommendation 12

That students be routinely questioned on aspects of their inquiry-based assessment task as part of the assessment process.

Government Response: **Support**

The completion of assignment work under classroom supervision is only one of a number of available strategies for ensuring the authenticity of student work. *Strategies for authenticating student work for learning and assessment* outlines additional strategies such as the progressive submission of plans and drafts, regular rotation of assessment topics, and requiring students to discuss aspects of the task and its production. There is no doubt schools already employ strategies like this.

³ http://www.qsa.qld.edu.au/downloads/publications/paper_qsa_auth_student_work.pdf

The document also includes a suggestion that teachers may:

“require a brief annotation, summary or discussion, written in class, exploring further some aspect of the subject matter or of the process of text production; this should help to indicate the extent of the student’s understanding and involvement in the task”

“require an interview with the student or have some other spoken discussion or presentation following the submission of the task to explore further or clarify some aspects”.

Given the importance of ensuring the authenticity of student work, these strategies need to have higher status. The Government considers a stronger approach would be appropriate: for the current authentication strategies to be developed into guidelines; for the guidelines to be appended to all senior syllabuses; for senior syllabuses to require school work programs to include authentication strategies aligned with the guidelines; and for the guidelines to be promoted and communicated to schools, including professional development of teachers. The guidelines should include appropriate strategies based on questioning of students concerning their work.

Actions

13. The Minister will request the QSA to produce guidelines for authenticating student assessment completed outside class, and amend all senior syllabuses to require school work programs to include authentication strategies aligned with the guidelines.

14. The Minister will request the QSA to promote rigorous authentication by communicating the guidelines to schools, as part of state-wide workshops for senior science HODs during 2014, and as professional development for teachers.

B. STANDARDS AND MARKING

The inquiry heard claims that the current criteria and standards are too complex and wordy and, at the same time, unclear or lacking in detail. Some teachers have internalised the criteria and have no difficulty applying them. Others find them cumbersome: the language impenetrable or the distinctions between levels inadequate.

When it comes to assessing individual assessment tasks, there is dissension about how best to reflect students’ achievement against the standards. This flows on into disagreement over how to collate student results on individual assessments to give an overall result on each of the three exit criteria.

Recommendation 6

The committee recommends the syllabus documentation be provided with more detail about standards of achievement against each criteria, to support teachers in their task of assessing students’ standards of achievement against each criteria.

Government Response: Support

The Government agrees that additional support should be given to schools and teachers to assist them in interpreting and applying the standards of student achievement against the general objectives and exit criteria. Teachers should be able to judge student achievement in ways that are consistent but also efficient, not imposing unreasonable workloads.

The Government believes the additional support should be provided in supplementary syllabus documentation rather than the syllabus itself, in the light of two developments.

- The terms of reference of the senior assessment and tertiary entrance review require it to consider “the adequacy of the current exit levels of achievement”. The review will consider fundamental issues relating to the way that standards are formulated and articulated in syllabus documents, so its findings in July 2014 are likely to have implications for the articulation and application of syllabus criteria and standards.
- The Australian Curriculum includes achievement standards⁴, which will be incorporated in Queensland syllabuses when the curriculum is implemented.

The support to schools and teachers should address both the general definition of the standards and their application to particular items of student assessment.

Actions

15. The Minister will request the QSA to include the interpretation and application of syllabus standards of student achievement in the state-wide workshops for senior science HODs during 2014, and to provide support to teachers through its website and professional development.
16. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 6 in accordance with its terms of reference.

Recommendation 13

The committee recommends that in the context of standards-based assessment, numerical marking be strongly promoted in maths, chemistry and physics alongside more specifically defined syllabus documents (see Recommendation 6) that include mark ranges to equate to each of the five standards of achievement for each criteria, to:

- a) increase clarity for students and teachers as to why particular standards of achievement are awarded*
- b) ensure an appropriate focus is placed on content knowledge along with the higher order skills (numerical marks readily allowing weighting)*
- c) reduce workload for teachers*
- d) enable employers and universities and importantly, students themselves to readily see what content a student knows and does not know.*

Government Response: **Support**

The Government acknowledges that QSA has deliberately given schools discretion as to how to record student achievement on particular assessment tasks, as long as the results can be collated against the three exit criteria. However, the evidence from the inquiry is that at least some schools are unclear as to what this discretion means in practice. On this issue, therefore, the Government believes that QSA should provide more guidance to schools.

⁴ Australian Curriculum draft achievement standards can be sighted for eg Physics <http://www.australiancurriculum.edu.au/SeniorSecondary/Science/Physics/AchievementStandards>; Chemistry <http://www.australiancurriculum.edu.au/SeniorSecondary/Science/Chemistry/AchievementStandards>; and Mathematical Methods <http://www.australiancurriculum.edu.au/SeniorSecondary/Mathematics/Mathematical-Methods/AchievementStandards>

To remove any remaining ambiguity regarding the use of numerical marks to record achievement on individual assessment instruments, the QSA will be requested to develop specific supporting resources that outline appropriate uses of numerical marks linked to syllabus criteria and standards.

More extensive application of numerical marks, and the technical challenges that apply to them, will be considered by the review of senior assessment and tertiary entrance. Its terms of reference require review of the adequacy of the current exit levels of achievement and the form and content of reports to students and parents.

Action

17. The Minister will request the QSA to write to all principals prior to the commencement of Term 1, 2014 clarifying that schools have discretion to implement numerical marking and upfront percentage weightings for senior maths and science subjects.
18. The Minister will request the QSA to develop appropriate approaches to assessing individual tasks with numerical marks and using them to make standards-based judgments for exit criteria.
19. The Minister will request the QSA to communicate these approaches through its website and the state-wide workshops for senior science HODs during 2014, and to ensure consistent treatment of numerical marking by review panels.
20. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 13 in accordance with its terms of reference.

C. ADDITIONAL SUPPORT FOR TEACHERS

The committee has proposed a number of measures aimed at providing teachers with additional support in the development and administration of senior assessment processes.

Recommendation 3:

The committee recommends that the syllabus documentation specify the goals of senior mathematics, chemistry and physics courses, in terms of post-school directions; and explicitly advise how the courses will achieve those.

Government Response: Support

The Government agrees with the committee's observation that it would be desirable for syllabuses to explicitly outline the intent and objectives of the course, and the extent to which these objectives relate to preparation for further study, or to skills required in personal, vocational and civic life.

It is noted that senior Australian Curriculum material developed by the Australian Curriculum Assessment and Reporting Authority includes statements to this effect as part of the rationale for each senior subject. For example, the current General Mathematics subject rationale states that:

"General Mathematics is designed for those students who want to extend their mathematical skills beyond Year 10 level but whose future studies or employment pathways do not require knowledge of calculus. The subject is designed for students who have a wide range of educational and employment aspirations, including continuing their studies at university or TAFE."⁵

Action

21. The Minister will request that the QSA amend senior syllabus documents to include an outline of the post-school objectives that underlie all senior syllabus documents, taking into account material that has already been developed as part of draft Australian Curriculum senior subjects.

Recommendation 11

The committee recommends that a 'catalogue' of common inquiry-based assessment tasks, developed by trained specialist teachers and with associated task-specific assessment guides be developed to support teachers. The national curriculum may provide an opportunity for sharing of resources and experiences on a national scale, with support from industry and academia.

Government Response: **Support**

The Government supports the provision of high quality exemplars as a resource to support teacher assessment knowledge and expertise.

It is understood the QSA has recently established a consolidated on-line assessment "hub" with a range of sample assessments, annotated student responses and supporting documents. This currently includes 25 inquiry-based assessment tasks, task-specific criteria sheets and annotated student responses for Chemistry and Physics and 27 inquiry-based assessment tasks and related resources for Mathematics A, B and C.

Action

22. The Minister will request that the QSA continue and extend the provision of sample inquiry-based assessment tasks as a resource for teachers.

Recommendation 15

The committee recommends the QSA provide more direction to schools and teachers in respect of requirements for school-based assessment tasks, both in the syllabus documents and through training.

Government Response: **Support**

The Government concurs with the committee's view that further direction and support are required in relation to the requirements of school-based assessment.

The QSA has recently provided a range of additional workshops and on-line materials dealing specifically with the use of EEIs. This has included on-line video resources and provision of free EEI workshops to nearly 600 senior chemistry, physics and biology teachers in Term 3, 2013.

The Government notes the QSA Governing Body's acknowledgement that the findings of the inquiry show that further work needs to be done to address the issue of assessing core content in mathematics and sciences.

Actions

23. The Minister will request the QSA to provide a series of state-wide workshops for senior science HODs during 2014, covering a range of key issues relating to the implementation of school-based assessment.

24. The Minister will request the QSA to include a range of additional information in senior syllabuses as outlined under Recommendations 3, 8 and 12.

D. FURTHER RESEARCH

The committee has highlighted two areas for further research.

Recommendation 5

The committee recommends that research be undertaken into whether there are differential impacts of standards-based assessment for humanities and mathematical and scientific subjects.

Government Response: Support

Queensland was the first Australian jurisdiction to introduce standards-based assessment. All Australian states and territories now adopt a standards-based approach to school assessment and reporting, albeit with a strong external assessment component as well. The Australian Curriculum also employs a standards-based approach, with a series of A to E achievement standards provided for each subject.

The committee, in considering evidence of teacher concerns regarding the implementation of assessment standards for mathematics, chemistry and physics, has questioned whether syllabus standards may need to be expressed at a greater level of detail in these subjects. It has queried the applicability to the sciences and mathematics of certain types of assessment instruments, and certain methods of recording student achievement, and suggested others are more appropriate.

The Government acknowledges further research may inform and improve the implementation of a standards-based approach across particular subjects and domains. Given the range of diversity of existing senior subjects, it may also be useful for this research to extend beyond a comparison of humanities and mathematical and science subjects.

This research will be conducted by an independent body that is not responsible for the development or administration of Queensland syllabus standards. Ideally, initial results from this research would be available to support Government's consideration of the recommendations of the review of senior assessment and tertiary entrance, which are to be provided to the Minister by 31 July 2014.

Action

25. The Minister will commission independent research regarding the implementation of standards-based senior assessment across a range of senior subjects.

Recommendation 16

The committee recommends the government undertake research to establish benchmarks and, at an appropriate time, evaluate performance progress in Queensland and compare Queensland performance in senior mathematics, chemistry and physics (and all senior subjects) with the performance of senior students in other Australian jurisdictions and internationally.

Government Response: Support

The Government acknowledges the committee findings regarding the scarcity of available evidence capable of supporting benchmark comparisons of senior student achievement over time and between Australian and international jurisdictions. As noted by the committee, this in part reflects underlying differences in curriculum and assessment approaches across jurisdictions.

While the Australian Curriculum will, over time, provide a degree of commonality in curriculum content and achievement standards, comparability will still be subject to differences in course structure and assessment, as well as the characteristics of student cohorts in each jurisdiction.

Work in this area is also highly dependent on the active involvement and cooperation of state and non-state school and curriculum authorities in other Australian jurisdictions.

In this context, the Government will engage independent research aimed at identifying appropriate methodologies that could be used to compare senior student assessment folios.

Action

26. The Minister will commission independent research to report on the feasibility of evaluating performance in senior subjects over time, and comparative performance across jurisdictions.

E. EXTERNAL EXAMS, SCALING AND MODERATION

The Government notes the committee's observation that the benefits of school-based assessment appear to be widely accepted, both in terms of the range of opportunities it provides to students and the support and recognition it affords the professionalism of the teaching workforce.

The Government also notes the committee's view that a balance of school-based assessment and external examinations may offer a number of advantages. In particular, the committee considers that common external examinations may provide:

- a publicly available statement of what all students have been required to know and do in a particular subject;
- greater consistency in the coverage of syllabus content; and
- enhanced confidence in the reliability and validity of senior assessment.

The committee suggests that the use of common external examinations, and their application as a mechanism for statistical moderation of schools' assessment results, may also ensure an appropriate focus on content and procedural knowledge as a necessary foundation for "higher-order" skills such as analysis and evaluation.

The Government accepts the committee's view that considerations regarding the validity and reliability of senior assessment processes in mathematics, chemistry and physics must include broader processes such as moderation that are designed to ensure the comparability of school-based assessment. As the committee has acknowledged, recommendations on these broader systemic issues relate to issues under consideration as part of the independent review of senior assessment and tertiary entrance. The Government concurs with the committee's view (p 4) that it is desirable for these important systemic issues to be considered from two different vantage points.

Recommendation 2

The committee recommends that an external exam count for 50% of a student's overall achievement mark in senior mathematics, chemistry and physics to:

- a) ensure an appropriate focus on content knowledge which, of the three criteria for each subject, is the one most readily testable by an exam task (and what is tested, gets taught)*

- b) *ensure an element of commonality in respect of content knowledge around the state, which makes comparing student scores more meaningful for employers and universities*
- c) *promote confidence in the validity of all of a student's final mark for a subject by increasing the likelihood of consistent assessment practices against a common task.*

Government Response: **Support for further consideration**

The Government acknowledges the potential benefits of external examinations outlined in the committee report the incorporation of common external examinations in senior mathematics, chemistry and physics subjects would represent a major systemic change. While the committee suggests there is no reason for the same model of assessment to be used in every senior subject, the introduction of 50% external examinations in only three subject areas would in effect represent a dual assessment system with significant potential implications in terms of additional teacher support and the perceived relative status of senior subjects.

Against this background, the Government considers that further evidence is required in relation to the potential benefits, implications and costs, of external examinations, in the context of a broader and consistent framework of senior assessment.

Action

27. The Minister will request the review of senior assessment and tertiary entrance to consider and report on Recommendation 2 in accordance with its terms of reference.

Recommendation 4

The committee recommends that the subject-based external exam for mathematics, chemistry and physics be used to scale school-based assessments, in recognition of the fact that exams provide a valid assessment of a student having 'the basic' content and procedural knowledge in the subject area and that the criteria relating to this knowledge should be a primary determinant of the student's achievement level in these subjects.

Government Response: **Support for further consideration**

The Government sees this recommendation, along with Recommendations 2 and 14, as falling squarely within the terms of reference for the independent review of senior assessment and tertiary entrance.

The terms of reference require the reviewer to take account of assessment models employed in other states and territories. This would include consideration of models in which the results of external examinations are used to scale the results of school-based assessment.

Action

28. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 4 in accordance with its terms of reference.

Recommendation 14

The committee recommends that a (reduced) mechanism to enable teachers to set and review school-based assessment tasks should continue to operate for senior mathematics, chemistry and physics, but that this mechanism not be used to moderate school-based assessments.

Government Response: **Support for further consideration**

The use of panel-based social moderation will be considered as part of the independent review of senior assessment and tertiary entrance processes.

In the interim, it is understood that the QSA has taken a number of recent measures to support the consistency of moderation panel decisions. This has included:

- a review of panel appointment processes
- a range of online training resources and support materials for panel members
- a range of additional moderation resources to support schools in the preparation of material for panel-based verification processes.

Action

29. The Minister will request the independent review of senior assessment and tertiary entrance to consider and report on Recommendation 14 in accordance with its terms of reference.