

# Technologies literature review

Senior syllabus redevelopment

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# Executive summary

Table 1: Subjects comprising the current Technologies subject group

Subject	Type
<b>Information communication and technology subgroup</b>	
Information Processing and Technology 2010	Authority
Information Technology Systems 2012	Authority
Information and Communication Technology 2014	Authority-registered
ICT10115 Certificate I in Information, Digital Media and Technology	VET
ICT20115 Certificate II in Information, Digital Media and Technology	VET
ICT30115 Certificate III in Information, Digital Media and Technology	VET
<b>Home economics and hospitality subgroup</b>	
Home Economics 2010	Authority
Hospitality Studies 2012	Authority
LMT21707 Certificate II in Applied Fashion Design and Technology	VET
SIT10213 Certificate I in Hospitality	VET
SIT20213 Certificate II in Hospitality	VET
SIT20312 Certificate II in Kitchen Operations	VET
SIT30703 Certificate III in Hospitality	VET
<b>Design subgroup</b>	
Aerospace Studies 2011	Authority
Engineering Technology 2010	Authority
Graphics 2013	Authority
Technology Studies 2013	Authority
Building and Construction Skills 2015	Authority-registered
Early Childhood Studies 2014	Authority-registered
Engineering Skills 2015	Authority-registered
Fashion 2014	Authority-registered
Furnishing Skills 2015	Authority-registered
Hospitality Practices 2014	Authority-registered
Industrial Graphics Skills 2015	Authority-registered
Industrial Technology Skills 2015	Authority-registered
AUM10113 Certificate I in Automotive Manufacturing	VET
CHC30113 Certificate III in Early Childhood Education and Care	VET
MEM10105 Certificate I in Engineering	VET
MEM20413 Certificate II in Engineering Pathways	VET
MSA10107 Certificate I in Manufacturing (Pathways)	VET
MSA20107 Certificate II in Process Manufacturing	VET
MSA20208 Certificate II in Manufacturing Technology	VET
MSF10113 Certificate I in Furnishing	VET
MSF20113 Certificate II in Furnishing	VET

# Overview of methodology and findings

This literature review focuses on the current suite of Technologies subjects, which includes eight Authority subjects, nine Authority-registered subjects, and 17 commonly offered vocational education and training (VET) qualifications. To simplify discussion, these have been placed into three loose but distinct subgroups:

- Information communication and technology subgroup
- Home economics and hospitality subgroup
- Design subgroup.

The subjects and their subgroups are presented in Table 1 on page 1.

An environmental scan was undertaken of a range of Australian and international syllabus documents, outlined in Table 2 below. The international jurisdictions were chosen because, as proposed in Queensland, they make use of both internal and external assessment to determine students' level of achievement in senior secondary schooling.

**Table 2: Jurisdictions included in scan**

Jurisdiction	Comparison with QCAA syllabuses
<b>Australian jurisdictions</b>	
<b>NSW</b>	Board of Studies Teaching and Educational Standards, NSW (BOSTES) <a href="http://www.boardofstudies.nsw.edu.au/syllabus_hsc">www.boardofstudies.nsw.edu.au/syllabus_hsc</a>
<b>Vic.</b>	Victorian Curriculum and Assessment Authority (VCAA) <a href="http://www.vcaa.victoria.edu.au/Pages/vce/studies/index.aspx">www.vcaa.victoria.edu.au/Pages/vce/studies/index.aspx</a>
<b>WA</b>	School Curriculum and Standards Authority, Government of WA <a href="http://wace1516.scsa.wa.edu.au">http://wace1516.scsa.wa.edu.au</a>
<b>International jurisdictions</b>	
<b>UK–AQA</b>	The Assessment and Qualifications Alliance (AQA) is the awarding body in England, Wales and Northern Ireland. It compiles specifications and holds examinations in various subjects at General Certificate of Secondary Education (GCSE), AS-level (Advanced Subsidiary) and A-level (Advanced) and offers vocational qualifications. Qualifications are grouped into levels, from entry level to level 8. GCSE is level 2 and AS-levels and A-levels are both level 3. AS-levels are studied over one year, and A-levels over two years. A-levels provide appropriate breadth and depth of learning for a tertiary pathway and are the focus of the jurisdiction scan. <a href="http://www.aqa.org.uk/subjects">www.aqa.org.uk/subjects</a>
<b>Singapore</b>	Administered by Singapore Examinations and Assessment Board. Singapore demonstrates high (and rising) performance in international tests, particularly Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). School tuition in Singapore is in English. <a href="http://www.seab.gov.sg">www.seab.gov.sg</a>
<b>NZ</b>	Administered by NZ Ministry of Education. New Zealand has a unique structure for senior secondary schooling and a genuinely national curriculum with tuition in both English and the Maori language. New Zealand's performance in international tests is comparable to that of Australia. <a href="http://seniorsecondary.tki.org.nz">http://seniorsecondary.tki.org.nz</a>

## Summary of recommendations

The distinguishing characteristic of subjects in the current Technologies subject group is that they all engage students in a range of cognitive, creative, communication and critical thinking skills, as well as include a technical or 'hands-on' component. This hands-on component is more than a demonstration of performative skill; it is also a demonstration of knowledge — it embodies a student's design thinking, something which is otherwise difficult to articulate. Perhaps, because of the tradition of school-based assessment in Queensland, the Technologies subjects have all moved to a unique position which privileges project work and the evidencing of understanding, supported through reflection and evaluation, and through artefacts such as machines, software programs, garments, furniture and portfolios. In all national and international jurisdictions reviewed, the emphasis (in part) appears to be on prescriptive theory and the assessment of understanding through formal written examinations. The Queensland syllabuses have thus become an example of constructionism, a student-centred learning theory allied to constructivism and experiential learning, which is bound up in the notion of learning-by-doing and by being socially and reflexively engaged in the task (see Ackermann, 2004; Harel & Papert, 1991; Hoban, Nielsen & Carceller, 2010; Kafai & Resnick, 1996). The Technologies subjects are about process and product, with the product being an embodiment of the process and its inherent decision-making, problem-solving and technical skill.

The overarching recommendation is that this unique approach is maintained and that the emphasis remains on meaningful practical outcomes for students in Technologies. This respects the cognitive aspects of these subjects (over the performative) and allows the subjects to genuinely address the 21st century skills of creativity, critical thinking and communication.

# 1 Subject group: Significant emerging trends

## 1.1 Assessment

In regard to Technologies subjects, the three Australian jurisdictions reviewed (New South Wales, Victoria, and Western Australia) share a model of assessment which combines school-based assessment and a common external examination and which offers different approaches in Year 11 and 12. For example, in New South Wales, the preliminary course (Year 11) assessment is internal and administered wholly by the school while, in the HSC course (Year 12), equally weighted internal and external assessments are conducted. A similar model exists in Victoria (i.e. school based in Year 11, school and authority administered in Year 12).

The three international jurisdictions reviewed (United Kingdom–AQA, Singapore, and New Zealand) tend towards common external written examinations. For example, in Singapore there are two assessment tasks of unequal weighting. The course work task is higher (60%) and completed over a prescribed time (60 hours) as opposed to an external examination (40%). In New Zealand, there is a mix of internal and external assessments that give students accreditation across three levels. The New Zealand National Certificate of Educational Achievement (NCEA) does offer the achievement of credits from school-based work and the moderation of a portfolio for external assessment. In the United Kingdom AS and A levels, there is an internal and an external assessment (examination or portfolio) of equal weighting. All focus on individual assessment with little or no reference to group work or collaboration.

In summary, the weighting in each Australian jurisdiction favours written assessment over practical. Two of the international jurisdictions reviewed, namely Singapore and United Kingdom–AQA, similarly privilege written examinations (based on prescriptive content) with the United Kingdom–AQA also including a Controlled (non-examination) Task. These all appear contrary to the current approach in Queensland and are contrary to the preferred notion of assessing a range of cognitive skills, as well as hands-on approaches in Technologies subjects. Few offer supporting scaffolds for student evaluations, such as the CIPP<sup>1</sup> Framework offered in Queensland's *Information Technology Systems 2012* senior syllabus or the CSfW<sup>2</sup> Framework adopted in many of the Authority-registered subjects to support the affective aspects of student achievement.

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<sup>1</sup> Contexts, inputs, processes and products

<sup>2</sup> Core Skills for Work

## 1.2 Pedagogical approaches

Two pedagogical approaches can be discerned through the alignment of assessment to pedagogy:

- where theoretical examinations based on prescribed content were a form of assessment (namely, New South Wales, Victoria, Western Australia, Singapore, United Kingdom–AQA), it can be assumed that the most common pedagogy would be direct instruction
- where assessments are part of coursework, the focus is on hands-on engagement that facilitates the application of knowledge and skills in challenging activities. As a consequence, the pedagogical approaches relate to modelling and guided instruction. The New Zealand NCEA curriculum is the least prescriptive of those reviewed with a basis in more student-centred pedagogies and allowing greater choice in how schools design their work programs.

## 1.3 Implications for the revision of Queensland syllabuses in the subject group

The current suite of Queensland Curriculum and Assessment Authority (QCAA) Technologies syllabuses have been built on the notion of knowledge being embedded in practical projects to solve problems or challenges. For example, in the ICT syllabuses, knowledge of programming concepts and syntax is shown in the development of a program rather than being solely tested in an isolated way.

The emphasis on practical application has served the Technologies syllabuses well, as it focuses on active learning and critical thinking. Most of the jurisdictions reviewed have reverted to content-focused approaches to teaching and assessment (see Section 2.3). It is difficult to see how such an approach would interest Queensland senior secondary students or follow logically from the Queensland or Australian Curriculum learning area: Technologies.

Importantly, a consideration of the content in the Technology syllabuses offered in the reviewed jurisdictions shows little similarity.

Where content topics have similar names, they are rarely studied to the same depth or breadth.

For example, the QCAA senior syllabuses *Information Processing and Technology 2010* and *Information Technology Systems 2012* and the subject area syllabus *Information and Communication Technology 2014* are unique. Together, they offer more than is offered in other jurisdictions and they are more rigorous. For example, in New South Wales and Victoria, database design is taught through proprietary software (Microsoft Access) whereas in *Information Processing and Technology 2010* in Queensland, this is taught through Structured Query Language (SQL). Similarly, where web design or multimedia is taught in other Australian



jurisdictions, it lacks the rigour offered in *Information Technology Systems 2012* in Queensland where students work with development rather than proprietary software.

Where there is significant overlap in the key learning outcomes or course objectives across the jurisdictions, they are rarely labelled in the same ways.

Critically, Queensland is the only jurisdiction that has retained the title 'Home Economics'. All other states have incorporated 'food', 'technology' or 'nutrition' as key words to identify the focus of this subject in the Technologies learning area. While in New South Wales there are two subjects — *Food Technology* and *Textiles and Design*, in Queensland and New Zealand both these subjects are subsumed in the Home Economics subject. In all other jurisdictions (Victoria, Western Australia, Singapore, and the United Kingdom), the contextual focus is predominantly on food.

## 1.4 Recommendations

Given the practical nature of all the subjects reviewed, it is recommended that internal assessments lean towards designing inquiry-based, open-ended projects (as is the case in some of the subjects). This should align with the types of tasks that the students will be presented in the real world. Digital technologies options should be considered in the design of the assessment tasks. External assessment items should draw upon students' higher-order thinking skills such as application, analysis, and evaluation. The following specific recommendations apply to subgroups.

### Information communication and technology subgroup

#### Recommendation 1: Information communication and technology subgroup

The information communication and technology syllabuses in Queensland place an emphasis on critical thinking, which must be maintained. While the rigour of the Queensland subjects should be maintained, there could be an argument for the volume of learning in each of the subjects as it appears to exceed what is taught in other jurisdictions. The emphasis on practical output should be maintained to allow for applied rather than rote learning.

As they cover quite distinct aspects of information and communication technology, an argument can be substantiated to maintain a QCAA Authority subject focused on critical thinking and another subject focused on applied learning. Having more than one senior secondary information communication and technology subject seems to be quite common in other jurisdictions.

#### Recommendation 2: Information Processing and Technology 2010

Focus on embedding theory into practical outcomes should be retained rather than adopting a predominance of written theoretical examinations based on prescriptive lists of content as seen in other jurisdictions. Similarly, the focus on problem-solving using software development models

and critical thinking is to be maintained. Consideration might be given to a change in approach to some topics that are currently taught in greater depth or to a more sophisticated level than in similar subjects in other jurisdictions, particularly *Relational Information Systems* and *Structured Query Language (SQL)*. There are now links between *F–10 Australian Curriculum: Technologies* and *Information Processing and Technology 2010* because of the focus on algorithms and coding (programming) in the Australian Curriculum *Digital Technologies* subject. *Information Processing and Technology 2010* has some comparability with subjects in New South Wales, Victoria, Western Australia, United Kingdom–AQA and Singapore.

### **Recommendation 3: Information Technology Systems 2012**

The unique structure of *Information Technology Systems 2012*, which is built around a design process and elements applied to various information communication and technology contexts, should be retained and could be extended. It describes itself as ‘practical’ and therefore explicitly promotes the importance of practical over theoretical outcomes. It does, and should continue to, scaffold complementary theoretical and evaluative processes through the CIPP (contexts, inputs, processes and products) model. *Information Technology Systems 2012* has some comparability with syllabus documents in New South Wales, Victoria, Western Australia and New Zealand. Some of these syllabus documents contain embedded VET qualifications, which was previously the case for *Information Technology Systems 2012*. It is not recommended that QCAA return to this model.

### **Recommendation 4: Information and Communication Technology 2014**

Focus on practical and technical skills achieved through authentic projects should be maintained. In its current form, *Information and Communication Technology 2014* acts as a logical extension to information communication and technology as a general capability in the Australian Curriculum, particularly in *F–10 The Arts*. *Information and Communication Technology 2014* has some comparability with syllabus documents in New South Wales, Victoria and Western Australia, particularly in the Units 1 and 2 (Year 11) of the four-unit courses of study. No equivalence was noted in the international jurisdictions reviewed, although all maintained similar subjects up to Year 10.

## **Home economics and hospitality subgroup**

### **Recommendation 5: Home Economics 2010**

A change in the title for *Home Economics 2010* should be considered. Given that the teaching and learning focus of the current syllabus leans towards the rationale of a technology course (with design challenges and aspects of a technology syllabus), a name change is recommended (to include ‘technology’) and to bring it in line with the other states and jurisdictions. All other states and jurisdictions scanned offer separate design and food technology subjects and have

incorporated 'food', 'design', or 'technology' as key words to identify the focus of the subject in the Technologies learning area. Findings also indicated that a greater depth of learning in food and nutrition and textiles and design could be incorporated by offering two subjects. New South Wales, Victoria and Western Australia have clearly defined topics in these subjects that are unitised or expressed as a percentage of the whole course of study. For example, in Western Australia, *Unit 3: Food preparation, processing, and food controls* is 18% of the course. Such models should be considered for Queensland as it presents more clarity for both teachers and students.

### **Recommendation 6: Hospitality Studies 2012**

*Hospitality Studies 2012* is the only one of its kind in Australia offered as an Authority syllabus. All other interstate syllabus documents which are focused on a similar topic have a VET component embedded in them. There is also some overlap with *Hospitality Practices 2014*, and with units that lead to VET qualifications. It is recommended that given the close connections between these subjects, the dual accreditation options that are available to students in New South Wales, Victoria and Western Australia be considered.

## **Design subgroup**

### **Recommendation 7: Aerospace Studies 2011**

*Aerospace Studies 2011* has only one comparable syllabus document, namely, the Western Australian *Aviation ATAR course*. The focus on critical thinking and communication should be maintained. However, attention should be given to the limited opportunities for creative thinking, collaboration and teamwork, personal and social skills, and information communication and technology skills.

### **Recommendation 8: Engineering Technology 2010**

*Engineering Technology 2010* provides an opportunity for students to gain an understanding of the underlying principles of engineering in its broadest sense. It is concerned with the theoretical concepts and practical applications related to technology, industry and society, engineering materials, engineering mechanics, and control systems. Integral to *Engineering Technology 2010* is an understanding of the engineering design process — the creative, iterative process used by engineers to help develop products and to devise systems, components or processes that meet human needs. This is a decision-making process in which science, mathematics and engineering knowledge is applied to convert resources to meet a stated objective. The emphases on critical and creative thinking in this syllabus should be maintained.

### **Recommendation 9: Graphics 2013**

*Graphics 2013* engages students in solving design problems and presenting their ideas and solutions as graphical products. Students explore design problems through the lens of a design

process where they identify and explore a need or opportunity of a target audience; research, generate and develop ideas; and produce and evaluate solutions. One of the significant strengths of *Graphics 2013* is in its adoption and balance of digital and manual skills, i.e. use of computer-aided design and drafting (CADD) as well as hand-sketching skills. This subject is based on problem-solving and embeds a range of higher-order thinking skills.

### **Recommendation 10: Technology Studies 2013**

*Technology Studies 2013* provides opportunities for students to develop skills in strategic and creative thinking, practical problem-solving, information analysis, and project management, and challenges them to understand and appreciate technological innovation and its impact on society. This syllabus bears some similarity to *Graphics 2013* in the content and design process learnt and applied. *Home Economics 2010* and *Information Technology Systems 2012* also share a focus on design that requires the balancing of technical, commercial, human, cultural and aesthetic requirements and there is an overlap in the study of industrial design with *Graphics 2013*. Theory is embedded in practical outcomes in all these subjects, i.e. products or prototypes designed and created by students.

## 2 Subjects in the group: Overview, comparison and connections

### 2.1 QCAA syllabuses and VET qualifications

#### General observations

- Where Authority and Authority-registered syllabuses showed some overlap in content, the depth and the breadth varied.
- The assessment in Authority and Authority-registered syllabuses varied significantly in terms of dimensions and complexity.
- The assessment in Authority syllabuses and VET subjects varied significantly in terms of intent and complexity.
- The similarity between Authority and Authority-registered syllabuses lies in the emphasis on practical problem-solving.

The sections below look at similarities, differences and overlaps between the syllabus types in each subgroup:

- Authority subjects vs Authority-registered subjects
- Authority subjects vs VET subjects
- Authority-registered subjects vs VET subjects.

#### Information communication and technology subgroup

##### Authority subjects vs Authority-registered subjects

There are some similarities between these. They generally have:

- distinct content, i.e. *Information Processing and Technology 2010* — software development and *Information Technology Systems 2012* — design, using software
- similar approaches to teaching and assessment in *Information Technology Systems 2012* and *Information and Communication Technology 2014* with both subjects focusing on a problem solving process using similar objectives. Overlap in contexts between *Information and Communication Technology 2014* and *Information Technology Systems 2012* due to the wide range of contexts available, i.e. animation, website production and network fundamentals.

##### Authority subjects vs VET subjects

There are no significant similarities. Content and approach differ widely.

## Authority-registered subjects vs VET subjects

There are similarities in content between Certificate III in Information, Digital Media and Technology and *Information and Communication Technology 2014*, particularly in the specialisations of website technology and networking administration.

There are, however, significant differences in approach and the learning experiences embedded in each course.

## Home economics and hospitality subgroup

### Authority subjects vs Authority-registered subjects

- *Home Economics 2010* and *Hospitality Studies 2012* are two distinct subjects with very limited overlap.
- There is some similarity in content between *Home Economics 2010* and *Fashion 2014*, i.e. textile and fashion are covered but explored from different perspectives.
- There is some overlap in the focuses of *Hospitality Studies 2012* and *Hospitality Practices 2014*, i.e. both have a real-world focus on services associated with hospitality.
- Students are expected to demonstrate different thinking skills in the assessment tasks because they are assessed against standards in different dimensions, e.g.
  - Inquiring, Planning and Performing in *Hospitality Studies 2012*
  - Knowing and understanding, Examining and applying, and Planning and evaluating in *Hospitality Practices 2014*.

Consequently, teaching and learning, and assessment instruments are also different.

### Authority subjects vs VET subjects

- There is some similarity in content between *Home Economics 2010* and Certificate II in Applied Fashion Design and Technology, i.e. textile and fashion are covered but explored from different perspectives.
- There is some overlap in the content between *Hospitality Studies 2010* and Certificates I, II, III in Hospitality, i.e. a real-world focus on services associated with hospitality.

### Authority-registered subjects vs VET subjects

- There is some overlap in content between *Fashion 2014* and Certificate II in Applied Fashion Design and Technology, i.e. textile and fashion are covered but explored from different perspectives.
- There is some overlap in the content between *Hospitality Practices 2014* and Certificates I, II, III in Hospitality, i.e. a real-world focus on services associated with hospitality.

## Design subgroup

### Authority subjects vs Authority-registered subjects

- *Aerospace Studies 2011* is designed for students who have a special interest in the aviation and aerospace industry. It is a unique course of study in Queensland.
- *Graphics 2013* is about solving design problems (in *Graphic design*, *Industrial design* and *Built environment*), whereas *Industrial Graphic Skills 2015* emphasises drawing skills used by manufacturing industries focused on *Industry practices* and *Drafting processes*. *Graphics 2013* has a strong focus on theory and practice whereas *Industrial Graphics 2015* tends to focus more on practice. Consequently, teaching and learning and assessment instruments are also different. The overlap between the subjects is minimal.
- In their own right, *Engineering Technology 2010* and *Technology Studies 2013* are unique subjects. In both these subjects, the theory is intertwined with the practice of designing. In *Technology Studies 2013*, students develop solutions to real-world problems using a design process. In *Engineering Technology 2010*, students develop solutions to real-world engineering problems using an engineering design process.
- A different approach is adopted in Authority-registered subjects *Engineering Skills 2015*, *Industrial Technology Skills 2015*, *Furnishing Skills 2015* and *Building Construction Skills 2015*, where students create products from predefined specifications. That is, unlike Authority subjects, Authority-registered subjects focus on producing products from drawings rather than on solving real-world design problems. This has a significant impact on the content, approach and assessment in each subject — which makes them different.

### Authority subjects vs VET subjects

There are no significant overlaps between VET options and the Authority syllabuses in this subgroup. Content, approach and assessment differ widely.

### Authority-registered subjects vs VET subjects

There are some minor similarities between Authority-registered and VET subjects, e.g. courses of study in *Engineering Skills 2015* and Certificates in Engineering tend to focus on making products. However, they differ widely in the:

- bulk of the content
- teaching approach, e.g. VET subjects are conducted predominantly in workplaces
- assessment, e.g. VET assessment is competency based.

## 2.2 Recommendations

### Recommendation 11

In some of the interstate jurisdictions, VET Certificates are embedded in Authority subjects. This was the case with some Queensland syllabuses as well. The separation of QCAA and VET subjects is most evident in Queensland's *Information Technology Systems 2012*, which previously had VET certificates embedded. Removing it has allowed the implementation of more critical and creative learning experiences. The recommendation is to maintain this separation.

### Recommendation 12

There is no evidence of significant overlap in any of the Design subgroup courses. In Design Authority-registered subjects such as *Engineering Skills 2015*, *Industrial Technology Skills 2015*, *Furnishing Skills 2015*, *Building Construction Skills 2015* and *Industrial Graphics 2015*, the focus is on technological processes and skills that lead to the creation of products to meet societal needs.

The Authority subjects *Technology Studies 2013* and *Graphics 2013* are more concerned with designing products or graphical products, while *Engineering Technology 2010* includes the application of engineering knowledge to devise and test prototype solutions. The contexts and the cognitive demand that is placed on students vary from subject to subject. This is also the case with the Home economics and hospitality subgroup. The emphasis on hands-on engagement is commendable as this promotes experiential learning and demonstrates all the attributes of constructivist learning environments.

### Recommendation 13

On a continuum, while the emphasis on theory diminishes as one looks at Authority subjects, Authority-registered subjects, and VET subjects, the reverse occurs when the focus is on practice. The subjects tend to cater for different groups of learners with varied study and career aspirations. Given this scenario, the different focus of these subjects should be maintained.

## 2.3 Comparable syllabuses from selected Australian and international jurisdictions

### General observations

#### New South Wales

- Senior schooling is organised into Preliminary and Higher School Certificate (HSC) courses, with similar objectives but differing content. There is also a HSC VET strand.
- Assessment in the Preliminary course is school administered and managed.



- There are two components of assessment in the HSC course and they have equal weighting: internal assessment and examination. Each assessment draws upon different thinking skills and a number of parts with clearly defined intentions.
- Additionally, HSC VET requirements add an optional formal examination on each of the stream focus areas; this subject is based on the mandatory achievement of Australian Qualifications Framework (AQF) VET units of competency and up to 70 hours of work placement. The VET units are embedded in the course.

## Victoria

- VCE (Victorian Certificate of Education) study designs (syllabus documents) are divided into four units (1–2, and 3–4).
- Assessment in Units 1 and 2 of VCE *Information Technology* is managed by the school (teacher assessment) and based on satisfactory completion of the outcomes specified for the unit. It is not reported to VCAA.
- VCAA supervises assessments in Units 3 and 4 (Year 12). The student's level of achievement in Outcome 2 in Unit 3 and Outcome 1 in Unit 4 is assessed through a school-assessed task, which includes a software solution plus appropriate documentation. The level of achievement for Units 3 and 4 is also assessed by an end-of-year examination (50%).
- There are four assessment tasks of four weightings — three of these are part of coursework. Task 4 is an end-of-year examination.

## Western Australia

- The WACE (Western Australian Certificate of Education) syllabuses are described in two parts: Year 11 (Units 1 and 2); and Year 12 (Units 3 and 4). Students typically undertake a subject in 'pairs' of units, with Unit 3 and 4 having to be studied as a pair.
- Students undertake study in a combination of ATAR (Australian Tertiary Admissions Rank), General, VET and Foundation courses to meet the WACE achievement standard.
- Schools report on the school-based assessment of units in both grades (A–E) and a mark (of 100).
- ATAR subjects, equivalent to Authority / Overall Position (OP) subjects, require students to sit for an external examination.

## United Kingdom–AQA

- The United Kingdom national curriculum culminates in GSCE (General Certificate of Secondary Education), or AS-level (Advanced Subsidiary) and A-level (Advanced) subjects. The GCSE is typically taken by school students aged 14 to 16, at a level below A-level. The A-level qualification is offered to students completing secondary and seeking a university pathway. The first part or year of the A-level is known as the A1-level or AS-level.

- Assessment is predominantly through examination with approximately 20% allowed for a controlled (not examination) assessment.
- Content to be taught and assessed is presented as prescriptive lists.

## Singapore

- The Singapore curriculum follows the United Kingdom model of GSCE, AS-level and A-level subjects.
- Assessment is predominantly based on written examinations (approximately 75%) with coursework (approximately 25%).

## New Zealand

- New Zealand has a national curriculum based on eight learning areas.
- The NCEA (National Certificate of Educational Achievement) has three levels, one for each of the last three years of secondary school (Years 11, 12 and 13). It contains a mix of internal and external assessments.
- The Technology learning area is based on three curriculum strands: Technological practice, Technological knowledge, and Nature of technology. All learning areas cover Year 1 (Level 1) to Year 13 (Level 8).

## Information communication and technology subgroup

Jurisdiction	Comparison with QCAA syllabuses
<b>Australian jurisdictions</b>	
<b>NSW</b>	<ul style="list-style-type: none"> <li>• <i>Software Design and Development Stage 6 Syllabus</i> has a conceptual link to <i>Information Processing and Technology 2010: Algorithms, Software programming</i></li> <li>• <i>Information Processes and Technology Stage 6 Syllabus</i> has a conceptual link to <i>Information Processing and Technology 2010: Structured query language (SQL)</i>.</li> <li>• <i>Information and Digital Technology Curriculum Framework Stage 6 Syllabus, based on the ICT Training Package (version 3) for implementation from 2016</i> has: <ul style="list-style-type: none"> <li>– limited comparability with <i>Information Technology Systems 2012</i> through content</li> <li>– comparability with <i>Information and Communication Technology 2014</i> through content, particularly, the three-stream focus areas: Web and software applications, Networking and hardware, and Digital animation.</li> </ul> </li> </ul>
<b>Vic.</b>	<ul style="list-style-type: none"> <li>• <i>Information Technology Study Design</i> has some comparability with <i>Information and Communication Technology 2014</i> content particularly Unit 1 (IT in action) and Unit 2 (IT pathways) which are introductory units based on skill development.</li> <li>• <i>Information Technology Study Design</i> has some comparability with <i>Information Processing and Technology 2010</i> content, particularly Unit 3 (IT applications) and Unit 4 (Software development).</li> <li>• <i>VCE Computing (formerly Information Technology)</i>, a syllabus document to be introduced in 2016, has some comparability with <i>Information Technology Systems 2012</i> in: <ul style="list-style-type: none"> <li>– its inclusion of a school-assessed task based on responses to design briefs / teacher-provided designs in Unit 3 (Informatics) and Unit 4 (Software development)</li> <li>– nominal content relating to web design (Unit 3–4 Informatics), and software tools (Unit 1 Computing).</li> </ul> </li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
<b>WA</b>	<ul style="list-style-type: none"> <li>The <i>Computer Science ATAR Course</i> has comparability with <i>Information Processing and Technology 2010</i> through its content, particularly, algorithms (Unit 2); relational information systems (Units 1&amp;3); software programming (Unit 2); and social and ethical issues (Units 2&amp;3).</li> <li>The <i>Applied Information Technology ATAR Course</i> has limited comparability with <i>Information Technology Systems 2012</i>. The comparability lies in the teaching approach, that is, of developing solutions for clients and the inclusion of social and ethical considerations. There is also some alignment through content.</li> <li>The <i>Applied Information Technology General Course</i> (compared with its ATAR course), has some comparability with <i>Information and Communication Technology 2014</i>. The difference lies in assessment in that this WA subject requires students to complete a common externally set task.</li> </ul>
<b>International jurisdictions</b>	
<b>UK–AQA</b>	<p>The syllabus document, <i>Computer Science (GCSE Draft 8520, AS Draft 7516, A-Level Draft 7517)</i>, has close parallels with <i>Information Processing and Technology 2010</i> through its inclusion of studies of algorithms, programming, data representation, computer systems and ethical issues.</p> <p>The main difference is the emphasis on theory and assessment through examination rather than demonstration of knowledge and skills through projects.</p>
<b>Singapore</b>	<p>The syllabus document, <i>Computer Studies is an O-Level School-Initiated Elective (OSIE)</i>. The similarity with <i>Information Processing and Technology 2010</i> lies in its focus on both the system life cycle; and the problem solution, including algorithm design, programming concepts and logic gates. The main difference lies in the reliance on assessment through a written examination rather than demonstrating understanding through projects.</p>
<b>NZ</b>	<p>The New Zealand Qualifications Authority (NZQA) <i>Digital Technologies Achievement Standards</i> allow schools to select from eleven units or Achievement Standards to build courses of study. This allows schools to develop Level 3 courses of study similar to <i>Information Processing and Technology 2010</i> and <i>Information Technology Systems 2012</i>. The external examinations also use a folder and a report which is similar to the Project assessment technique in the Queensland syllabuses.</p>

## Home economics and hospitality subgroup

Jurisdiction	Comparison with QCAA syllabuses
<b>Australian jurisdictions</b>	
<b>NSW</b>	<ul style="list-style-type: none"> <li><i>Food Technology Stage 6 Syllabus</i> and <i>Textile and Design Stage 6 Syllabus</i> have conceptual links to <i>Home Economics 2012</i>. The first two core topics (Individuals, families and communities and Nutrition and food) in <i>Home Economics 2012</i> overlap with the core topics in <i>Food Technology Stage 6 Syllabus</i>. The last core topic (Textiles and Fashion) has some overlap with the content of the <i>Textile and Design Stage 6 Syllabus</i>.</li> <li>The core strands in each syllabus document are clearly quantified as percentages (e.g. Food Manufacture 25%) which reflects the emphasis that each section needs on teaching and learning activities. While there is some commonality between the syllabus documents, the approach to assessment is very different. For example, in the <i>Textile and Design Stage 6 Syllabus</i>, there are two assessment components (internal assessment and examination) of equal weighting (50% each). Each assessment draws upon different thinking skills with clearly defined intentions and instruments, e.g. a textiles project (50%) is a significant part of the internal assessment.</li> <li>There is no syllabus document comparable with <i>Hospitality Studies 2012</i>. However, in the category of 'VET Curriculum Frameworks', Hospitality is offered as a dual accreditation course. Students can achieve Australian Quality Framework (AQF) VET qualifications once they complete the <i>SIT12 Tourism, Travel and Hospitality Training Package</i> (comprising four</li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
	<p>units). For HSC qualifications, students are administered an examination (80 marks) which is based on two mandatory and two focus areas.</p> <ul style="list-style-type: none"> <li>• There is no syllabus document comparable with <i>Hospitality Practices 2014</i>. However, in the category of 'Technology Life Skills' courses of study, 'Food Technology Life Skills' is offered as an option. The course of study is tailored to suit individual needs in areas such as food, technology processes and creation of food products. Assessment is against the course outcomes.</li> <li>• There is no syllabus document comparable with <i>Fashion 2014</i>. However, in the category of 'VET Board Endorsed Course' the <i>Fashion Design and Technology</i> can lead to AQF VET and HSC/Preliminary qualifications. Students can achieve Certificate II in Applied Fashion Design and Technology. Depending on the type of enrolment, students can also achieve credits for up to four units at either the HSC or Preliminary levels.</li> </ul>
<b>Vic.</b>	<ul style="list-style-type: none"> <li>• The content of the VCE <i>Food and Technology Study Design</i> has some overlap with the first two core topics (Individuals, families and communities and Nutrition and food) in <i>Home Economics 2010</i>. At this level, there are no syllabus documents which focus on the third core topic of Textiles and fashion. Some similarities exist in the VCE <i>Product Design and Technology Study Design</i> (e.g. Exploring product design factors and processes).</li> <li>• The approach to assessment is different when compared to <i>Home Economics 2010</i> in Queensland. Like NSW, the final result in the <i>Food and Technology Study Design</i> is dependent upon four assessment tasks. Three are coursework activities (weighted at 18%, 12% and 40%) while the final assessment is an end-of-year examination (30%).</li> <li>• Like New South Wales, there is no syllabus document comparable with <i>Hospitality Studies 2012</i>. However, in the category of 'VCE VET', Hospitality is offered as a dual accreditation course. Two program options lead to VET qualifications: Certificate II or Certificate III in Hospitality. The units are drawn from the <i>SIT07 Tourism, Hospitality, and Events Training Package</i>. For VCE qualifications, students are administered an examination (34%) and coursework tasks (66%) which are based on the VET units studied.</li> <li>• There is no syllabus document comparable with <i>Hospitality Practices 2014</i>.</li> <li>• Like NSW, there is no syllabus document comparable with <i>Fashion 2014</i>. In the category of 'VCE VET', the <i>Applied Fashion Design and Technology</i> course can lead to VET and VCE qualifications. Students can achieve Certificate II in Applied Fashion Design and Technology and statement of attainment for selected units in Certificate III. Depending on the type of enrolment, students can also achieve credits for up to six units towards VCE (4 credits in Units 1 and 2; 2 credits in Units 3 and 4).</li> </ul>
<b>WA</b>	<ul style="list-style-type: none"> <li>• In WA, <i>Food Science and Technology</i> has three course options. The <i>Food Science and Technology ATAR course</i> is most closely connected to <i>Home Economics 2010</i> in Queensland. Four key outcomes determine the content in the four units of the course. Like Vic., the <i>Food Science and Technology ATAR course</i> has some overlap with the first two core topics (Individuals, families and communities and Nutrition and food) in the <i>Home Economics 2010</i> course.</li> <li>• At this level, there are no courses which focus on the third core topic of Textiles and fashion. Some similarities exist with the Materials Design and Technology ATAR course where students can work with textiles, School-based assessments (70% in Year 11; 60% in Year 12) and examinations (30% in Year 11; 40% in Year 12) are administered in the course. Of significance is the breakdown in the emphasis of the school-based assessments. The assessment tasks are designed across three areas — Investigation, Production analysis, and Response.</li> <li>• There is no syllabus document comparable with <i>Hospitality Studies 2012</i>.</li> <li>• Like Vic. and NSW, there is no syllabus document comparable with <i>Hospitality Practices 2014</i>. However, in the 'VET Industry Specific' group of subjects, the <i>Hospitality and Tourism Syllabus</i> can lead to VET and WACE qualifications in some cases. Students can achieve Certificate I and II qualifications in Hospitality and Certificate II qualifications in Kitchen Operations. The completion of Certificate II leads to four course unit credits (2 in Year 11 and 2 in Year 12).</li> <li>• There is no comparable subject to <i>Fashion 2014</i>.</li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
<b>International jurisdictions</b>	
<b>UK–AQA</b>	<ul style="list-style-type: none"> <li>The interpretation here is based on the draft specification for A-level <i>Design and Technology: Food Technology (2540)</i>. Like Vic. and WA, this course focuses on food science and nutrition. Therefore, there is some overlap with the first two core topics of <i>Home Economics 2010</i>. Students develop their knowledge of the core topics as they engage in the design and manufacture of food products. There is no mention of Textiles and fashion in the document; however, A-level <i>Design and Technology: Product Design —Textiles (2560)</i> provides opportunities for students' creativity and innovation skills to be nurtured and developed as they make products using a range of materials, including textiles. Assessment is similar to NSW, Vic. and WA. There is a written examination (50%) and two non-examination assessments (Investigation and Portfolio) with a weighting of 25% each.</li> <li>There is no syllabus document comparable with <i>Hospitality Studies 2012</i>, <i>Hospitality Practices 2014</i> or <i>Fashion 2014</i>.</li> </ul>
<b>Singapore</b>	<ul style="list-style-type: none"> <li>At this level, <i>GCE Food and Nutrition</i> offers two options — <i>GCE Normal (Academic)</i> and <i>GCE Ordinary</i> levels. The three key topics in the <i>GCE Normal (Academic)</i> syllabus document align to some extent with the first two core topics in the <i>Home Economics 2010</i> course in Queensland. Textile and Fashion is not a part of this course. There are two assessment tasks: a two-hour written examination (40%) focused on Knowledge and Understanding and Coursework (60%), which involves Problem-solving and Experimentation associated with a given task. Singapore is the only state which expects students to complete the coursework over 15–20 hours.</li> <li>There is no syllabus document comparable with <i>Hospitality Studies 2012</i>, <i>Hospitality Practices 2014</i> or <i>Fashion 2014</i>.</li> </ul>
<b>NZ</b>	<ul style="list-style-type: none"> <li>Students enrolled in <i>Home Economics</i> (which has a conceptual link to <i>Home Economics 2010</i>) work through Levels 1–3 in Years 11–13. This is the only jurisdiction which retains 'Home Economics' in the title (like Qld) and has a similar focus on Food and Textiles. In Level 1, the study is based on Food and Nutrition (Core topics 1 and 2 of the <i>Home Economics</i> syllabus document). In Level 2, students explore textiles and related products. The Level 3 standard draws upon students' abilities to demonstrate their knowledge across more complex activities, e.g. creating a garment for a specific purpose, investigating and analysis of societal contexts and issues. Assessment is a mix of coursework activities with specific outcomes and examinations in each level.</li> <li>There is no syllabus document comparable with <i>Hospitality Studies 2012</i>.</li> <li>There is no syllabus document comparable with <i>Hospitality Practices 2014</i>. However, there are four VET-type options in this area — <i>Hospitality (Entry Skills)</i>, <i>Hospitality (Foundation Skills)</i>, <i>Hospitality (Introductory Cookery)</i>, and <i>Marae Catering (Level 2)</i>. Training and assessment is workplace based.</li> <li>There is no syllabus document comparable with <i>Fashion 2014</i>. However, the <i>Clothing Manufacture (Elementary Sewing Skills)</i> qualification enables students to develop basic machining skills through workplace training.</li> </ul>

## Design subgroup

Jurisdiction	Comparison with QCAA syllabuses
<b>Australian jurisdictions</b>	
<b>NSW</b>	<ul style="list-style-type: none"> <li>There is no syllabus document comparable with <i>Aerospace Studies 2011</i> or <i>Graphics 2013</i>.</li> <li>The <i>Engineering Studies Stage 6 Syllabus</i> has some overlap with <i>Engineering Technology 2010</i> but course content is very different. In each year, there are four compulsory modules (identified as application and focus modules). There is a strong emphasis on investigations and hands-on engagement. Assessment is based on two equally weighted sources — internal assessment and an examination. Internal assessment, which draw upon three specific components (e.g. Skills in research, Problem-solving and Communication related to engineering). One of the internal assessment instruments is an engineering report (worth 10% in Year 11 and 20% in Year 12).</li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
	<ul style="list-style-type: none"> <li>• The <i>Design and Technology Stage 6 Syllabus</i> has a conceptual link with <i>Technology Studies 2013</i>. There is a strong emphasis on hands-on activities and design projects connected to the real world. In Year 11 Preliminary (internal assessment), there are three assessments: Case study (20%); Other tasks (20%); Designing and producing (60%). In Year 12 HSC, there is a Written examination (40 marks, 1.5 hours) and a Major design project (60 marks).</li> <li>• The <i>Construction Curriculum Framework Stage 6 Syllabus</i> has some comparability with <i>Building and Construction Skills 2015</i> course. The primary objective is for students to develop skills in this field so that it sets the foundation for work and further study. For AQF VET qualifications, assessment is competency based. There is a HSC examination (2 hours — 80 marks) option which can contribute to the calculation of students' Australian Tertiary Admission Rank (ATAR). The <i>Construction</i> HSC examination can contribute up to two units towards the calculation of a student's ATAR.</li> <li>• The <i>Industrial Technology Stage 6 Syllabus</i> has some overlap with the <i>Industrial Technology Skills 2015</i> course. In both the Preliminary and the HSC courses, students develop theoretical knowledge, which is then applied to a project. The HSC examination comprises a Written paper (40 marks) and a Major project (60 marks).</li> </ul>
Vic.	<ul style="list-style-type: none"> <li>• There is no syllabus document comparable with <i>Aerospace Studies 2011</i>.</li> <li>• The VCE <i>Visual Communication Design Study Design</i>, like <i>Graphics 2013</i> focuses on the design of visual communications using a design process. Students solve design problems and present their solutions as graphical products for an intended audience. Units 1 and 2 are school-based assessments and Units 3 and 4 are VCAA supervised. The tasks are as follows: Unit 3 — School-assessed coursework (20%); Unit 4 — School-assessed coursework (5%); School-assessed task (40%) and End-of-semester examination (35%).</li> <li>• The VCE <i>Systems Engineering Study Design</i> has a direct connection to <i>Engineering Technology 2010</i> through acknowledgment of the important role of the various forms of control systems (e.g. electrical and mechanical) and of the design of engineered solutions to societal problems. However, the content of <i>Engineering Technology 2010</i> is broader in scope, with <i>Systems Engineering</i> focused on engineering systems contexts only. Units 3 and 4 (Year 12) contribute to a subject result using a combination of School-assessed coursework and task (70%) and an Examination (30%). Units 1 and 2 are school-based assessments and Units 3 and 4 are VCAA supervised. The tasks are as follows: Unit 3 — School-assessed coursework (10%); Unit 4 — School-assessed coursework (10%); School-assessed task (50%) and End of semester examination (30%).</li> <li>• The VCE <i>Product Design and Technology Study Design</i> has some comparability with <i>Technology Studies 2013</i>. As expected, there is a strong emphasis on design and technology (e.g. Exploring product design factors and processes, Intellectual property rights, Collaborative design). Four units are completed over two years. Units 1 and 2 are school-based assessments and Units 3 and 4 are VCAA supervised. The tasks are as follows: Unit 3 — School-assessed coursework (12%); Unit 4 — School-assessed coursework (8%); School-assessed task (50%) and end-of-semester examination (30%).</li> <li>• The VCE VET <i>Building and Construction</i> qualification offers students prevocational training in the building and construction industry. Thus, there are some conceptual links to the <i>Building and Construction Skills 2015</i> course. Students who complete this course are also eligible for up to seven units' credit towards their VCE. These results can also impact on their ATAR ranking.</li> <li>• The VCE VET <i>Engineering</i> qualification has some overlap with <i>Engineering Skills 2015</i> subject area syllabus (SAS). A significant difference is that the SAS course does not contain a VET component. All units in the course are competency based and drawn from Certificate II in Engineering Studies.</li> <li>• The VCE VET <i>Furnishing</i> qualification has some overlap with <i>Furnishing Skills 2015</i>. A significant difference is that the SAS course does not contain a VET component. All units in the course are competency based and drawn from Certificate II in Furniture Making. Students can be eligible for up to five units towards their VCE qualifications: three units at Units 1 and 2 level and a Units 3 and 4 sequence. A study score is available for this program, which can contribute directly towards student's ATAR. Students' are also eligible for VCAL qualifications: either at the Foundation, Intermediate or Senior levels.</li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
<b>WA</b>	<ul style="list-style-type: none"> <li>• WACE <i>Aviation</i> offers two course options. The <i>Aviation ATAR</i> is most closely connected to the <i>Aerospace Studies 2011</i> course in Queensland. There are four key outcomes which determine the content in the four units of the course in each year. There is some overlap between the units (e.g. Unit 2 — Aviation operations is similar in both states). Assessment in both years entails: Investigation (10%); Test (20%); Examination (50%); Practical examination (20%).</li> <li>• WACE <i>Design</i> offers two course options. The <i>Design ATAR</i> is most closely connected to the <i>Graphics 2013</i> and Materials Design and Technology ATAR aligns with <i>Technology Studies 2013</i> course in Queensland. There are four key outcomes which determine the content in the four units of the course in each year. In both courses, the school-based assessments focus on practicals and written tasks. In Year 11, have three components: Design — practical folio (25%), Production — practical (50%), and Response — written (25%). In Year 12, there are two assessment tasks: Practical (50%) and Written (50%).</li> <li>• WACE <i>Building and Construction</i> has some overlap with <i>Building and Construction Skills 2015</i>. In each of the four units, appropriate theoretical concepts build on the practical aspects of the course. In Year 11, there are three assessment tasks: Production — extended manufacturing project/s (20%), Response — respond to series of stimuli (70%) and Teacher-selected assessment (10%). In Year 12, there are also three assessments: Design — Research and investigation (20%); Production — Extended manufacturing projects (50%), and Externally set task — written task/item or set of items of one-hour duration developed by school and the School Curriculum and Standards Authority (30%).</li> <li>• WACE Engineering Studies ATAR course is comparable with <i>Engineering Technology 2010</i>. In Year 12, there are three assessment tasks: Design: project folio (30%), Production: product and project folio (30%) and Examination (40%).</li> </ul>
<b>International jurisdictions</b>	
<b>UK–AQA</b>	<ul style="list-style-type: none"> <li>• There is no syllabus document comparable with <i>Aerospace Studies 2011</i>.</li> <li>• A-level <i>Design and Technology: System and Control Technology (2555)</i> has some comparability with <i>Engineering Technology 2010</i>. AQA are not planning to offer this subject after June 2018. The course emphasis is on the application of knowledge and understanding to produce multiple solutions to problems. This then leads to the planning, producing and evaluating of products. There are two assessments: Unit 1 — Written paper, 2 hours (25%) tests students' knowledge; Unit 2 — Design and making practice, Design folder (25%) which is a controlled activity-based assessment to evaluate students' abilities to investigate the design context, develop design proposals (including modelling), make, test and evaluate, and communicate.</li> <li>• GCSE <i>Design and Technology Graphics Products (4550)</i> has some overlap with the <i>Graphics 2013</i> course., This is a practical subject area for 14- to 16-year-old students focused on Designing and Making skills and requires the application of knowledge and understanding when developing ideas, planning and producing products and evaluating them. There are two assessments: Unit 1 — Written paper, 2 hours (40%) which tests students' knowledge, Unit 2 — Design and making practice, 45 hours (60%). This is a controlled activity-based assessment, which evaluates students' abilities to create artefacts that incorporate: Investigating the design context, Developing design proposals, Making (including modelling), Testing and evaluating prototypes. Communication is a key aspect of the process.</li> <li>• A-level <i>Design and Technology: Product Design (Draft 7551 and 7552)</i> has some overlap with <i>Technology Studies 2013</i>. Students' creativity and innovation skills are nurtured and developed as they make products using a range of materials. There are two assessments: Unit 1 — Written paper, 2 hours, 120 marks (40%) and Unit 2 — Designing and making practice, 45 hours, 90 marks (60%). A single Designing and making activity selected from a range of Board-set tasks are at the core of this assessment.</li> </ul>
<b>Singapore</b>	<ul style="list-style-type: none"> <li>• There is no syllabus document comparable with <i>Aerospace Studies 2011</i>, <i>Engineering Technology 2010</i> or <i>Graphics 2013</i>.</li> <li>• There is no syllabus document comparable with <i>Technology Studies 2013</i>. There is a compulsory <i>Design and Technology</i> subject in lower secondary.</li> </ul>

Jurisdiction	Comparison with QCAA syllabuses
NZ	<ul style="list-style-type: none"> <li>• There is no syllabus document comparable with <i>Aerospace Studies 2011</i> or <i>Engineering Technology 2010</i>.</li> <li>• There is no syllabus document comparable with <i>Graphics 2013</i>. However, Graphics is studied as a specialist strand over one semester in the <i>Technology</i> course.</li> <li>• The <i>Technology</i> syllabus document has some overlap with <i>Technology Studies 2013</i>. It has a hands-on approach as in other jurisdictions. Assessment is a mix of coursework activities with specific outcomes and examinations in each level.</li> </ul>

## 2.4 Recommendations

### Recommendation 14: Information communication and technology subgroup

All jurisdictions reviewed offer subjects in information communication and technology but none align exactly with the suite of subjects currently offered in Queensland. The learning that aligns with Queensland's Authority subjects is comparable with IPT and limited comparability is evident with ITS. Most use similar naming conventions but some have moved to subject names with 'digital' in their title. All, with the exception of New Zealand, have moved to prescriptive and theoretical courses assessed through theoretical examinations rather than project-based work. All are based on notions of computational thinking but do not adopt this term.

### Recommendation 15: Home economics and hospitality subgroup

Queensland and New Zealand retain 'Home Economics' in the titles. The content in both these subjects focus on food and textiles. In all other jurisdictions, courses that focus on food, do so in greater depth over a two-year course of study. This is reflected in the titles of the respective subjects with words such as 'food', 'technology', and 'nutrition'. It is recommended that Queensland follow suit and change the title to reflect the content of the course, e.g. Food Technology. The textiles and fashion area of study in *Home Economics 2010* is comparable with the learning in design and technology subjects offered in most jurisdictions. In these subjects, students solve design problems (challenges in *Home Economics 2010*) and present their solutions, such as a textile artefact (product). The redevelopment of subjects needs to consider how textiles and fashion is offered in the learning area: combined with food or in a design subject that considers the common design discipline of learning.

None of the other jurisdictions (interstate and overseas) offer a subject similar to *Hospitality Studies 2012*. As tourism plays a significant part in Queensland and this remains an area of high employment, such a course is warranted. It may be worthwhile to follow the developments of the United Kingdom's *GSCE Food Preparation and Nutrition 8585*, which is academically less challenging than A-level courses. While the proposed draft suggests that food will be at the core of the redeveloped syllabus, the types of assessment tasks embedded in the course will be of interest.



## Recommendation 16: Design subgroup

The suite of Design syllabuses in Queensland was rarely replicated in other jurisdictions. For example, there is only one instance of an Aerospace Studies syllabus document being offered elsewhere. In all instances, the comparable subjects were based on hands-on or practical outcomes with differing degrees of embedded theory. Queensland's Authority subjects place higher emphases on critical and creative thinking than other jurisdictions and this should be maintained. Singapore has consistently performed well in Programme for International Student Assessment (PISA) tests across disciplines for a number of years. However, Technology and Design syllabus documents have not found a place in the senior curriculum. This is worth further investigation, especially into the role that Technology and Engineering play in the Science, Technology, Engineering and Mathematics (STEM) agenda.

## 2.5 Connections with the Australian Curriculum

Syllabus type	Syllabus	Path	AC subject
Authority syllabuses	• Aerospace Studies 2011	Yes	No
	• Engineering Technology 2010	Yes	No
	• Graphics 2013	Yes	No
	• Home Economics 2010	Yes	No
	• Hospitality Studies 2012	Yes	No
	• Information Processing and Technology 2010	Yes	No
	• Information Technology Systems 2012	Yes	No
	• Technology Studies 2013	Yes	No
Authority-registered syllabuses	• Building and Construction Skills 2015	Yes	No
	• Engineering Skills 2015	Yes	No
	• Fashion 2014	Yes	No
	• Furnishing Skills 2015	Yes	No
	• Hospitality Practices 2014	Yes	No
	• Industrial Graphics Skills 2015	Yes	No
	• Industrial Technology Skills 2015	Yes	No
	• Information and Communication Technology 2014	Yes	No

## 2.6 Implications for the revision of Queensland syllabuses in the subject group

- There is no senior secondary syllabus document for *Australian Curriculum: Technologies*.
- The *Australian Curriculum: Digital Technologies* subject provides the pathway to Queensland senior information communication and technology syllabuses. *Digital Technologies* is a subject within the *F–10 Australian Curriculum: Technologies* learning area, which is studied by all students from Foundation to the end of Year 8, and offered as an elective in Years 9 and 10.

- Queensland Information Technology subjects should consider the Queensland Government's *Advancing education* action plan and #codingcounts initiative.
- There is a clear but limited link to *Information Technology Systems 2012* from the *F–10 Australian Curriculum: The Arts* learning area.
- For all Authority and Authority-registered subjects in the subgroups, the technology process and the making of products and artefacts is significant. In this respect, the *F–10 Australian Curriculum: Technologies* has the potential to lay strong foundations.

## 2.7 Recommendations

### Recommendation 17

The *F–10 Australian Curriculum: Technologies* learning area needs to have a sustained focus on developing students' knowledge of technology processes and how it impacts on the creation of products, models or prototypes. Such an approach will not only have a positive influence on subjects in this group, it will also make a positive contribution to STEM education.

# 3 Learning expectations

## 3.1 Scope of learning across Australian and international jurisdictions

### Information communication and technology subgroup

Jurisdiction	Scope, organisation and description of learning
<b>Australian jurisdictions</b>	
<b>NSW</b>	<b>Software Design and Development Stage 6 Syllabus</b>
	<p><i>Preliminary</i></p> <p><b>Core strands — 100% total time</b></p> <p><b>Concepts and Issues in the Design and Development of Software (30%)</b></p> <ul style="list-style-type: none"> <li>• Social and ethical issues</li> <li>• Hardware and software</li> <li>• Software development approaches</li> </ul> <p><b>Introduction to Software Development (50%)</b></p> <ul style="list-style-type: none"> <li>• Defining and understanding the problem</li> <li>• Planning and designing software solutions</li> <li>• Implementing software solutions</li> <li>• Testing and evaluating software solutions</li> <li>• Maintaining software solutions</li> <li>• Developing Software Solutions (20%)</li> </ul>
	<p><i>HSC</i></p> <p><b>Core strands — 80% total time</b></p> <p><b>Development and Impact of Software Solutions (15%)</b></p> <ul style="list-style-type: none"> <li>• Social and ethical issues</li> <li>• Application of software development approaches</li> </ul> <p><b>Software Development Cycle (40%)</b></p> <ul style="list-style-type: none"> <li>• Defining and understanding the problem</li> <li>• Planning and designing software solutions</li> <li>• Implementing software solutions</li> <li>• Testing and evaluating software solutions</li> <li>• Maintaining software solutions</li> </ul> <p><b>Developing a Solution Package (25%)</b></p> <ul style="list-style-type: none"> <li>• <b>Options (20%)</b>, one of the following:               <ul style="list-style-type: none"> <li>- Programming paradigms</li> <li>- The interrelationship between software and hardware</li> </ul> </li> </ul>
	<b>Information Processes and Technology Stage 6 Syllabus</b>
	<p><i>Preliminary</i></p> <p><b>Introduction to Information Skills and Systems (20%)</b></p> <ul style="list-style-type: none"> <li>• Information systems in context</li> <li>• Information processes</li> <li>• The nature of data and information</li> <li>• Reasons for digital data representation</li> <li>• Social and ethical issues</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p><b>Tools for Information Processes (50%)</b></p> <ul style="list-style-type: none"> <li>• Collecting</li> <li>• Organising</li> <li>• Analysing</li> <li>• Storing and retrieving</li> <li>• Processing</li> <li>• Transmitting and Receiving</li> <li>• Displaying</li> <li>• Integration of processes</li> </ul> <p><b>Developing Information Systems (30%)</b></p> <ul style="list-style-type: none"> <li>• Traditional stages in developing a system</li> <li>• Complexity of systems</li> <li>• Roles of people involved in systems development</li> <li>• Social and ethical issues</li> </ul> <hr/> <p><b>HSC</b></p> <p><b>Project Management (20%)</b></p> <ul style="list-style-type: none"> <li>• Techniques for managing a project</li> <li>• Understanding the problem</li> <li>• Planning</li> <li>• Designing solutions</li> <li>• Implementing</li> <li>• Testing, evaluating and maintaining</li> </ul> <p><b>Information Systems and Databases (20%)</b></p> <ul style="list-style-type: none"> <li>• Information systems</li> <li>• Database information systems</li> <li>• Organisation</li> <li>• Storage and retrieval</li> <li>• Other information processes</li> <li>• Issues related to information systems</li> </ul> <p><b>Communication Systems (20%)</b></p> <ul style="list-style-type: none"> <li>• Characteristics of communication systems</li> <li>• Examples of communication systems</li> <li>• Transmitting and receiving in communication systems</li> <li>• Other information processes in communication systems</li> <li>• Managing communication systems</li> <li>• Issues related to communication systems</li> </ul> <p><b>Option Strands (40%), two of the following options:</b></p> <ul style="list-style-type: none"> <li>• Transaction Processing Systems</li> <li>• Decision Support Systems</li> <li>• Automated Manufacturing Systems</li> <li>• Multimedia Systems</li> </ul> <hr/> <p><b>Information and Digital Technology Curriculum Framework Stage 6 Syllabus</b></p> <ul style="list-style-type: none"> <li>• Information and Digital Technology (120 or 240 indicative hours)</li> <li>• Information and Digital Technology Specialisation Study (60 or 120 or 180 or 240 indicative hours)</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p><b>AQF VET qualifications</b></p> <p>The <i>Information and Digital Technology Curriculum Framework Stage 6 Syllabus</i> is based on <i>Information and Communications Technology Training Package (ICA11)</i>.</p> <p>The AQF VET qualifications available in the <i>Information and Digital Technology Curriculum Framework Stage 6 Syllabus</i> are:</p> <ul style="list-style-type: none"> <li>• ICA30111 Statement of Attainment towards Certificate III in Information, Digital Media and Technology</li> <li>• ICA30111 Certificate III in Information, Digital Media and Technology</li> </ul> <p><b>HSC VET course and AQF VET qualification completion requirements</b></p> <p>HSC VET courses in the <i>Information and Digital Technology Curriculum Framework Stage 6 Syllabus</i> are made up of:</p> <ul style="list-style-type: none"> <li>• units of competency</li> <li>• associated HSC mandatory units of competency</li> <li>• associated HSC stream units of competency</li> <li>• HSC elective units of competency</li> <li>• HSC outcomes and content</li> <li>• mandatory HSC work placement requirements</li> </ul>
Vic.	<p><b>VCE Information Technology Study Design</b></p> <p><b>Unit 1: IT in action</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> From data to information (using spreadsheet software)</li> <li>• <i>Area of Study 2:</i> Networks</li> <li>• <i>Area of Study 3:</i> ICT in a global society using spreadsheet software, web authoring software, visualising thinking tool/s, tool for planning a project</li> </ul> <p><b>Unit 2: IT pathways</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Data analysis and visualisation (using one or more of the following: a programming language, database software, spreadsheet software, data visualisation software)</li> <li>• <i>Area of Study 2:</i> Programming and pathways (using a programming or scripting language; tool for creating an electronic journal)</li> <li>• <i>Area of Study 3:</i> Tools, techniques and procedures (using any software tool that can be used to create a solution; tool for planning a project)</li> </ul> <p><b>Unit 3: IT applications</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Online communities (using web authoring software)</li> <li>• <i>Area of Study 2:</i> Organisations and data management — using a relational database management system (RDBMS)</li> </ul> <p><b>Unit 3: Software development</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Analysing information problems — using unified modelling language (UML) to create use cases</li> <li>• <i>Area of Study 2:</i> Design and development — using an approved programming language</li> </ul> <p><b>Unit 4: IT applications</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Organisations and information needs — using a relational database management system (RDBMS) or spreadsheet software, web authoring or multimedia authoring software</li> <li>• <i>Area of Study 2:</i> Information management</li> </ul> <p><b>Unit 4: Software development</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Purpose-designed solutions — using an approved programming language; and an appropriate tool for creating user documentation</li> <li>• <i>Area of Study 2:</i> Evaluating purpose-designed solutions</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p><b>VCE Computing Study Design</b></p> <p><b>Unit 1: IT in action</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Data and graphic solutions (using any software tool to create a graphic solution)</li> <li>• <i>Area of Study 2:</i> Networks (using a graphic tool to represent a network solution)</li> <li>• <i>Area of Study 3:</i> Collaboration and communication (using web authoring software, visualising thinking tool/s, tool for planning a project)</li> </ul> <p><b>Unit 2: Computing</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Programming (using a programming or scripting language that can support object-oriented programming)</li> <li>• <i>Area of Study 2:</i> Data analysis and visualisation (using one data manipulation tool and one visualisation tool, e.g. a programming language, database software, spreadsheet software, data visualisation software)</li> <li>• <i>Area of Study 3:</i> Data management (using database management software)</li> </ul> <p><b>Unit 3</b></p> <p><b>Informatics</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Organisations and data management — an RDBMS; drawing or graphics software</li> <li>• <i>Area of Study 2:</i> Data analytics — drawing conclusions (using an appropriate tool for documenting project plans)</li> </ul> <p><b>Software development</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Programming practice (using an appropriate programming language)</li> <li>• <i>Area of Study 2:</i> Analysis and design (using unified modelling language to create use cases; and, an appropriate tool for documenting project plans)</li> </ul> <p><b>Unit 4</b></p> <p><b>Informatics</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Data analytics: presenting the findings (using software tools to manipulate data for creating a multimodal online solution)</li> <li>• <i>Area of Study 2:</i> Information management (using an appropriate tool for documenting project plans)</li> </ul> <p><b>Software development</b></p> <ul style="list-style-type: none"> <li>• <i>Area of Study 1:</i> Software solutions (using an appropriate programming language; and an appropriate tool for documenting project plans)</li> <li>• <i>Area of Study 2:</i> Interactions and impact</li> </ul>
WA	<p><b>WACE Computer Science ATAR Syllabus</b></p> <p><b>Year 11</b></p> <p><b>Unit 1: Developing computer-based systems and producing spreadsheet and database solutions</b></p> <ul style="list-style-type: none"> <li>• Systems analysis and development</li> <li>• Managing data</li> </ul> <p><b>Unit 2: Developing computer-based systems solutions and communications</b></p> <ul style="list-style-type: none"> <li>• Developing software</li> <li>• Programming</li> <li>• Networks and communications</li> </ul> <p><b>Year 12</b></p> <p><b>Unit 3: Design and development of computer-based systems and database solutions</b></p> <ul style="list-style-type: none"> <li>• Systems analysis and development</li> <li>• Managing data</li> </ul> <p><b>Unit 4: Design and development of communication systems and software solutions</b></p> <ul style="list-style-type: none"> <li>• Developing software</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<ul style="list-style-type: none"> <li>• Programming</li> <li>• Networks and communications</li> </ul> <p><b>WACE Applied Information Technology ATAR Syllabus</b></p> <p><b>Year 11</b>  <b>Unit 1: Media information and communication technologies</b></p> <ul style="list-style-type: none"> <li>• Design concepts</li> <li>• Hardware</li> <li>• Impacts of technology</li> <li>• Application skills</li> <li>• Project management</li> </ul> <p><b>Unit 2: Digital technologies in business</b></p> <ul style="list-style-type: none"> <li>• Managing data</li> <li>• Networks</li> <li>• Impacts of technology</li> <li>• Application skills</li> <li>• Project management</li> </ul> <p><b>Year 12</b>  <b>Unit 3: Evolving digital technologies</b></p> <ul style="list-style-type: none"> <li>• Design concepts</li> <li>• Hardware</li> <li>• Impacts of technology</li> <li>• Application skills</li> <li>• Project management</li> </ul> <p><b>Unit 4: Digital technologies within a global society</b></p> <ul style="list-style-type: none"> <li>• Managing data</li> <li>• Networks</li> <li>• Impacts of technology</li> <li>• Application skills</li> <li>• Project management</li> </ul> <p><b>WACE Applied Information Technology General Syllabus</b></p> <p><b>Year 11</b>  <b>Unit 1: Personal communication</b>  <b>Unit 2: Working with others</b>  The content is divided into the following areas:</p> <ul style="list-style-type: none"> <li>• Design concepts (Unit 1)</li> <li>• Managing data (Unit 2)</li> <li>• Hardware (Unit 1)</li> <li>• Networks (Unit 2)</li> <li>• Impacts of technology (Unit 1 and Unit 2)</li> <li>• Applications skills (Unit 1 and Unit 2)</li> <li>• Project management (Unit 1 and Unit 2)</li> </ul> <p><b>Year 12</b>  <b>Unit 3: Media information and communication technologies</b>  <b>Unit 4: Digital technologies in business</b>  The content is divided into the following areas:</p> <ul style="list-style-type: none"> <li>• Design concepts (Unit 3)</li> <li>• Managing data (Unit 4)</li> <li>• Hardware (Unit 3)</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<ul style="list-style-type: none"> <li>• Networks (Unit 4)</li> <li>• Impacts of technology (Unit 3 and Unit 4)</li> <li>• Applications skills (Unit 3 and Unit 4)</li> <li>• Project management (Unit 3 and Unit 4)</li> </ul>
<b>International jurisdictions</b>	
<b>UK–AQA</b>	<p data-bbox="391 439 1396 474"><b>Computer Science (GCSE Draft 8520; AS Draft 7516; A-Level Draft 7517)</b></p> <p data-bbox="391 497 1396 533">The scope of learning is evident in the subject content across GCSE, AS-level, and A-level.</p> <p data-bbox="391 533 1396 568"><b>GCSE</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of algorithms</li> <li>• Programming</li> <li>• Fundamentals of data representation</li> <li>• Computer systems</li> <li>• Fundamentals of computer networks</li> <li>• Fundamentals of cyber security</li> <li>• Ethical, legal and environmental impacts of digital technology on wider society, including issues of privacy</li> <li>• Aspects of software development</li> <li>• Non-examination assessment</li> </ul> <p data-bbox="391 913 1396 949"><b>AS-level</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of programming</li> <li>• Fundamentals of data structures</li> <li>• Systematic approach to problem solving</li> <li>• Theory of computation</li> <li>• Fundamentals of data representation</li> <li>• Fundamentals of computer systems</li> <li>• Fundamentals of computer organisation and architecture</li> <li>• Consequences of uses of computing</li> <li>• Fundamentals of communication and networking</li> </ul> <p data-bbox="391 1272 1396 1308"><b>A-level</b></p> <ul style="list-style-type: none"> <li>• Fundamentals of programming</li> <li>• Fundamentals of data structures</li> <li>• Fundamentals of algorithms</li> <li>• Theory of computation</li> <li>• Fundamentals of data representation</li> <li>• Fundamentals of computer systems</li> <li>• Fundamentals of computer organisation and architecture</li> <li>• Consequences of uses of computing</li> <li>• Fundamentals of communication and networking</li> <li>• Fundamentals of databases</li> <li>• Big Data</li> <li>• Fundamentals of functional programming</li> <li>• Systematic approach to problem solving</li> <li>• Non-examination assessment — the computing practical project</li> </ul>



Jurisdiction	Scope, organisation and description of learning
Singapore	<p data-bbox="389 219 614 253"><b>Computer Studies</b></p> <p data-bbox="389 275 1222 309"><b><i>GCE Ordinary Level Syllabus — O-Level School-Initiated Elective (OSIE)</i></b></p> <p data-bbox="389 311 740 338">The sections of the syllabus are:</p> <ul data-bbox="389 344 1318 521" style="list-style-type: none"> <li>• Applications of computers and their social and economic implications</li> <li>• System life cycle</li> <li>• Problem solution, including algorithm design, programming concepts and logic gates</li> <li>• Generic software and the organisation of data</li> <li>• Hardware, systems and communication.</li> </ul>
NZ	<p data-bbox="389 544 818 577"><b>Digital Technologies (DGT) (NCEA)</b></p> <p data-bbox="389 600 1082 633"><b>All learning areas cover Year 1 (Level 1) to Year 13 (Level 8).</b></p> <p data-bbox="389 636 1396 723">The New Zealand Qualifications Authority (NZQA) allows schools to select from a number of units or Achievement Standards to build courses of study. Schools may design courses which meet the achievement standards of the Technology learning area.</p> <p data-bbox="389 725 1396 842">Digital Technologies focus on understanding, developing and using digital software, hardware and electronic systems across a range of contexts including school, the home and wider community settings. Students develop understandings and skills related to producing quality digital outcomes or environments.</p> <p data-bbox="389 857 874 884">The components of Digital Technologies are:</p> <ul data-bbox="389 891 1396 1550" style="list-style-type: none"> <li>• Knowledge of Digital Information Management</li> <li>• Apply Digital Information Management Tools to Create an Outcome</li> <li>• Knowledge of Digital Media</li> <li>• Create a Digital Media Outcome</li> <li>• Knowledge of Computer Science and Software Engineering: <ul data-bbox="416 1070 1396 1550" style="list-style-type: none"> <li>- demonstrate understanding of complex concepts of information systems in an organisation</li> <li>- implement complex procedures to develop a relational database embedded in a specified digital outcome</li> <li>- demonstrate understanding of complex concepts of digital media</li> <li>- implement complex procedures to produce a specified digital media outcome</li> <li>- demonstrate understanding of areas of computer science</li> <li>- develop a complex computer program for a specified task</li> <li>- demonstrate understanding of complex concepts used in the design and construction of electronic environments</li> <li>- implement complex interfacing procedures in a specified electronic environment</li> <li>- implement complex techniques in constructing a specified complex electronic and embedded system</li> <li>- demonstrate understanding of wide area network technologies</li> <li>- implement procedures for administering a wide area network.</li> </ul> </li> </ul>

## Home economics and hospitality subgroup

Jurisdiction	Scope, organisation and description of learning
<b>Australian jurisdictions</b>	
<b>NSW</b>	<b>Food Technology Stage 6 Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus offers a study of food (e.g. food quality, nutrition), related processing methods (e.g. food manufacture) and issues (e.g. diet and health in Australia).</li> <li>• The Preliminary course has three strands focused on food.</li> <li>• The HSC course has four core strands, which focus on food-processing technologies and issues.</li> <li>• There is a strong emphasis on the development of knowledge and understanding and the application of a range of related skills.</li> </ul>
	<b>Textiles and Design Stage 6 Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus offers a study of textiles (e.g. functional and aesthetic requirements), their characteristics (e.g. properties and performance) and the industry (e.g. Australian textile, clothing, footwear and allied industries).</li> <li>• The Preliminary course has three topics focused on design, properties and the industry.</li> <li>• Half of the HSC course revisits these three topics, while the other half is focused on a textile project.</li> <li>• Like the <i>Food Technology Stage 6 Syllabus</i>, there is a strong emphasis on the development of knowledge and understanding and the application of a range of related skills.</li> </ul>
	<b>Hospitality Curriculum Framework Stage 6 Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus is designed to give students industry-recognised national vocational qualifications under the AQF as part of their NSW HSC.</li> <li>• The scope of learning for each of the focus areas (HSC content) is explicitly described in the syllabus. This constitutes lists and simple descriptors of content.</li> <li>• Because of the embedded VET certification, advice is given that the scope of learning for the HSC must be read and delivered in conjunction with an associated unit of competency.</li> </ul>
<b>Technology Life Skills Stage 6 Syllabus</b>	
<p>This syllabus provides hands-on opportunities for students to engage with a range of technologies and acquire knowledge, understanding and skills, which are transferable and facilitate lifelong learning. In terms of the learning activities, the teachers contextualise the syllabus in terms of the depth to which outcomes and content are studied, based on the priorities, needs and interests of students.</p>	
<b>Fashion Design Technology Stage 6 VET Board Endorsed Course Description</b>	
<ul style="list-style-type: none"> <li>• This syllabus document offers courses in two modes to develop students' knowledge, understanding and industry skills.</li> <li>• Students enrolled in the 120-hour course can achieve Certificate II qualifications and obtain a credit for two units at the Preliminary or HSC level.</li> <li>• Students enrolled in the 240-hour course can achieve Certificate II qualifications plus credits for four units at the Preliminary or HSC level.</li> <li>• In addition, they also have an opportunity to attempt all HSC core and selected elective units. The pattern of study is influenced by the option chosen by the students. There are core and elective units — each with its own indicative hours.</li> </ul>	

Jurisdiction	Scope, organisation and description of learning
Vic.	<b>VCE Food and Technology Study Design</b>
	<ul style="list-style-type: none"> <li>• This syllabus document is about food (properties and preparation) and technologies (e.g. food product development).</li> <li>• The course is divided into four units over two years — each with two to four areas of study.</li> <li>• There is a strong emphasis on the development of theoretical knowledge and the application of a range of related skills.</li> </ul>
	<b>VCE VET Hospitality</b>
	<ul style="list-style-type: none"> <li>• Like NSW, this syllabus document aims to develop students' knowledge and skills aligned with the hospitality industry, leading to work-related qualifications. The course offers Hospitality: <ul style="list-style-type: none"> <li>- Units 1 and 2 — comprising a range of specific stream and general elective units</li> <li>- Units 3 and 4 — offering two distinct streams for specific outcomes.</li> </ul> </li> </ul>
WA	<b>WACE Food Science and Technology ATAR Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus document is about food (e.g. properties of food), application of food technologies (e.g. develop food products), working in food environments (e.g. application of skills) and understanding the role of food in society (e.g. importance of human practices when applying food related technologies).</li> <li>• There are four units of study — two in each year.</li> <li>• There is a strong emphasis on students developing their understanding of concepts and then applying it in different contexts.</li> </ul>
	<b>Hospitality and Tourism VET Industry Specific Syllabus</b>
<ul style="list-style-type: none"> <li>• This syllabus document provides students with the opportunity to achieve nationally recognised vocational qualifications (Certificate I and II) under AQF and to gain School Curriculum and Standards Authority course unit credit towards the WACE.</li> <li>• Students develop relevant competencies, predominantly suitable for employment and further training in the hospitality and tourism industries.</li> </ul>	
<b>International jurisdictions</b>	
UK–AQA	<b>Food Preparation and Nutrition Specification (GSCE 8585)</b>
	<ul style="list-style-type: none"> <li>• This proposed syllabus document is about students developing cooking skills (e.g. demonstrate effective and safe cooking skills), food (e.g. application of food science), and its importance to human health (e.g. relationship between diet, nutrition and health).</li> <li>• Five topics have been proposed — these can be taught in any order.</li> <li>• Of significance is the inclusion of twelve food skills groups as part of the course organisation.</li> <li>• There is a strong emphasis on students developing theoretical knowledge and then applying it in food preparations.</li> </ul>

Jurisdiction	Scope, organisation and description of learning
Singapore	<b>Food and Nutrition GCE Ordinary Level Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus document is about nutrition (e.g. meal planning), health and diet (e.g. understanding links between diet and health) and making informed decisions about food and nutrition.</li> <li>• The course is delivered through three key topics.</li> <li>• There is a strong emphasis on students developing knowledge and then applying it to promote their wellbeing.</li> </ul>
NZ	<b>Home Economics Senior Secondary Curriculum Guide</b>
	<ul style="list-style-type: none"> <li>• This syllabus document enables students to develop their ideas about food and textiles at a personal, local and international level. Learning occurs in three levels: <ul style="list-style-type: none"> <li>– Level 1 is about nutrition</li> <li>– Level 2 is about textiles</li> <li>– Level 3 is about applying knowledge and skills in complex hands-on activities.</li> </ul> </li> <li>• Hospitality courses are similar in scope to VET courses offered in Australia.</li> </ul>

## Design subgroup

Jurisdiction	Scope, organisation and description of learning
<b>Australian jurisdictions</b>	
NSW	<b>Engineering Studies Stage 6 Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus document — conceptually connected to <i>Engineering Technology 2010</i> provides opportunities and challenges to students to deal with engineering concepts.</li> <li>• It is directed towards the development and application of Mathematics, Scientific and Technological Skills with the integration of Business and Management, which is not evident in the Queensland syllabus.</li> <li>• This syllabus also provides opportunities to investigate 5C and Mathematics disciplines with societal development and change.</li> <li>• Eight modules are studied in total: <ul style="list-style-type: none"> <li>– Year 11 has one focus (e.g. Biomedical engineering) and three application modules (e.g. Braking systems).</li> <li>– Year 12 has two focuses and two application modules.</li> </ul> </li> <li>• Each unit entails 60 contact hours.</li> </ul>
	<b>Design and Technology Stage 6 Syllabus</b>
	<ul style="list-style-type: none"> <li>• This syllabus — conceptually connected to <i>Technology Studies 2013</i> — develops students' conceptual understanding and enables them to creatively apply these to specific technological endeavours through design projects.</li> <li>• It also seeks to develop student's appreciation of the historical and cultural influences on design, technology, society and the environment. The course encourages students to develop design in areas of individual interest and to consider careers in the fields of design and manufacturing.</li> <li>• Year 11 (Preliminary — 120 hours) students participate in hands-on practical activities and develop their knowledge of the activities within industrial and commercial settings which support design and technology. They are expected to create design portfolios with at least two projects.</li> <li>• Year 12 (HSC — 120 hours) focuses on the synthesis of the content studied in the Preliminary course. The course is organised in a way that enables students to learn from a case study and complete a major project.</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p data-bbox="389 219 1046 250"><b>Construction Curriculum Framework Stage 6 Syllabus</b></p> <ul data-bbox="389 277 1396 680" style="list-style-type: none"> <li>• This syllabus has some overlap with <i>Building and Construction Skills 2015</i>. Its curriculum framework is designed to enable students to acquire a range of technical, practical, personal and organisational skills valued in and beyond the workplace.</li> <li>• As a consequence, students are also well positioned to acquire underpinning knowledge and skills related to work, employment and further training in the construction industry.</li> <li>• Through the study of this subject, students will gain experiences that can be applied in a range of contexts, including work, study and leisure that will assist them to make informed career choices.</li> <li>• This syllabus is very closely linked to industry whereas the <i>Building and Construction Skills 2015</i> provides the basis for further education and employment.</li> <li>• The <i>Construction Curriculum Framework</i> is based on qualifications and units of competency contained in the nationally endorsed <i>CPC08 Construction, Plumbing and Services Training Package</i> and therefore quite different to <i>Building and Construction 2015</i>.</li> </ul> <p data-bbox="389 707 865 739"><b>Industrial Technology Stage 6 Syllabus</b></p> <ul data-bbox="389 766 1396 1128" style="list-style-type: none"> <li>• This syllabus has some overlap with <i>Industrial Technology Skills 2015</i>. It provides a choice of six different focus area industries through which students can study the course.</li> <li>• Focus areas are chosen to cover a wide range of potentially accessible and locally available technologies.</li> <li>• The course incorporates content, which is related to current and developing technologies. It offers students the opportunity to study the interrelationships of technologies, equipment and materials used by industry and to develop skills through the processes of design, planning and production.</li> <li>• The course seeks to raise student's awareness of the interaction between technology, industry, society and the environment and to develop student's ability to make judgements about relevant issues. The course develops student's theoretical knowledge, which is then applied to a project.</li> </ul>
Vic.	<p data-bbox="389 1153 657 1184"><b>VCE VET Engineering</b></p> <ul data-bbox="389 1211 1396 1794" style="list-style-type: none"> <li>• This syllabus document is geared towards making the students industry ready. Students study 11 core and three elective VET units.</li> <li>• The focus of the VCE component is: <ul data-bbox="414 1310 1396 1467" style="list-style-type: none"> <li>- Units 1 and 2: Computer technology, using power tools and using hand tools. Electives can be chosen from: Fabrication, General Engineering, and Machine Engineering — Technical.</li> <li>- Units 3 and 4: Producing basic engineering sketches and drawings, handling engineering materials, performing computations and applying 5S procedures.</li> </ul> </li> <li>• VCE VET Vocational Training Program provides students with the opportunity to gain both VCE and a nationally recognised VET certificate (22209VIC Certificate II in Engineering Studies).</li> <li>• This qualification provides students with the skills and knowledge to undertake an apprenticeship in the engineering trades or with a foundation for professional engineering roles.</li> <li>• <i>Engineering Skills 2015</i> contains no VET component.</li> <li>• There are four units, which are studied over two years.</li> <li>• In Units 1 and 2, there are six compulsory and two elective units.</li> <li>• In Units 3 and 4, there are five compulsory units plus a minimum of one elective unit.</li> </ul> <p data-bbox="389 1821 1011 1852"><b>VCE Product Design and Technology Study Design</b></p> <ul data-bbox="389 1879 1396 1995" style="list-style-type: none"> <li>• This syllabus document is designed to promote sustainable behaviours and develop technical skills that can enable students to present multiple solutions to everyday situations. It has some comparability with <i>Technology Studies 2013</i> and <i>Home Economics 2010</i>.</li> <li>• The course aspires to produce confident and unique problem solvers and project managers</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p>who are well equipped to deal with multidisciplinary nature of modern workplaces.</p> <ul style="list-style-type: none"> <li>• It comprises four units: <ul style="list-style-type: none"> <li>– Unit 1: Product redesign and sustainability</li> <li>– Unit 2: Collaborative design</li> <li>– Unit 3: Applying product design process</li> <li>– Unit 4: Product development and evaluation.</li> </ul> </li> <li>• Each unit deals with specific content contained in Areas of Study and is designed to enable students to achieve a set of outcomes for that unit.</li> </ul> <p><b>VCE VET Building and Construction</b></p> <ul style="list-style-type: none"> <li>• This syllabus document — conceptually connected to <i>Building and Constructions Skills 2015</i> — offers students' prevocational training in the building and construction industry.</li> <li>• The VCE VET program is designed to give students the opportunity to gain experience across a number of building trades including: bricklaying, carpentry, painting and decorating, wall and ceiling lining, floor tiling and solid plastering.</li> <li>• As a pathway to various trades, it is similar to <i>Construction Curriculum Framework Stage 6</i> in NSW.</li> <li>• Upon completion, the qualification that is available to students is 22216VIC Certificate II in Building and Construction (Bricklaying, Carpentry, Painting and Decorating, Wall and Ceiling Lining, Wall and Floor Tiling, Solid Plastering and Stonemason).</li> <li>• It is a pre-apprenticeship course aimed at enhancing employment prospects in the building and construction industry.</li> </ul> <p><b>VCE VET Furnishing</b></p> <ul style="list-style-type: none"> <li>• This syllabus document has some overlap with <i>Furnishing Skills 2015</i> and prepares students for further training or work in a range of furnishing industries such as cabinet making, wood machining, polishing, upholstery and picture framing.</li> <li>• In some respects, it overlaps with <i>Furnishing Skills 2015</i> course but without the VET component.</li> <li>• It incorporates MSF20313 Certificate II in Furniture Making with selected units from MSF30213 Certificate III in Furniture Making, and consists of: <ul style="list-style-type: none"> <li>– Units 1 and 2 — three compulsory units plus minimum of three elective units</li> <li>– Units 3 and 4 — five compulsory units.</li> </ul> </li> </ul>
WA	<p><b>WACE Aviation ATAR Syllabus</b></p> <ul style="list-style-type: none"> <li>• This syllabus — conceptually connected to <i>Aerospace Studies 2011</i> — provides the opportunity to investigate the importance of aviation to our society.</li> <li>• The course puts more emphasis on the Social Sciences, Humanities and Environmental Science than <i>Aerospace Studies 2011</i>.</li> <li>• WACE Aviation ATAR has four units — two in each of Years 11 and 12.</li> <li>• Each unit entails 55 contact hours, and they are typically delivered as a pair.</li> <li>• This is different to the approach adopted in Queensland.</li> </ul> <p><b>WACE Materials, Design and Technology Syllabus</b></p> <ul style="list-style-type: none"> <li>• This syllabus, which has some overlap with <i>Technology Studies 2013</i> and Home Economics 2010 subjects, has three options.</li> <li>• The ATAR option is a practical course where students can choose to work with wood, metal or textiles in the design and manufacture of products.</li> <li>• The course enables students to showcase their ideas, innovation and creativity.</li> <li>• There are four outcomes per year level and course content is organised into two categories: <ul style="list-style-type: none"> <li>– common content</li> <li>– context-specific content.</li> </ul> </li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<ul style="list-style-type: none"> <li>• Students must study all of the common content and at least one of the contexts.</li> <li>• Like the <i>WACE Aviation ATAR Syllabus</i>, the Year 12 syllabus is divided into two units which are studied as a pair.</li> <li>• Each unit has a time allocation of 55 hours.</li> </ul> <p><b>WACE Building and Construction Syllabus</b></p> <ul style="list-style-type: none"> <li>• This syllabus has some overlap with <i>Building and Construction Skills 2015</i>. The study encompasses the development of skills and applications that align with many trades and professions in the construction Industry.</li> <li>• Students are given the opportunity to practise creating a physical environment, which is important in this age of environmental awareness.</li> <li>• Students learn and practice building processes and technologies including design, planning and management.</li> <li>• They develop <i>ethical practices</i> (which is the first time this word has been mentioned in any of the Building and Construction courses), and consider: quality assurance, duty of care, time management, contract management and liability.</li> <li>• This course provides a pathway to further studies in trades, engineering and architecture and leads to employment options, further vocational education and industry training.</li> <li>• In Years 11 and 12, there are two units each (110 total duration) which are studied as pairs.</li> </ul> <p><b>WACE Engineering Studies Syllabus</b></p> <ul style="list-style-type: none"> <li>• This syllabus is comparable with <i>Engineering Technology 2010</i>. The course provides opportunities for students to investigate, research and present information through a design process, and then undertake project management to make a functioning product.</li> <li>• Students apply engineering processes, understand underpinning scientific and mathematical principles, develop engineering technology skills and to understand the interrelationships between engineering projects and society</li> <li>• In Years 11 and 12, there are two units each (110 total duration) which are studied as pairs.</li> </ul> <p><b>WACE Design</b></p> <ul style="list-style-type: none"> <li>• This syllabus is comparable to <i>Graphics 2013</i> and develops skills and processes for future and current industry and employment markets.</li> <li>• Students learn design principles and processes, analyse problems and possibilities, and devise innovative strategies within design contexts. These include photography, graphics, dimensional design and technical graphics.</li> <li>• In Years 11 and 12, there are two units each (110 total duration) which are studied as pairs.</li> </ul>
<b>International jurisdictions</b>	
UK–AQA	<p><b>Design and Technology: System and Control Technology (A-level 2555)</b></p> <ul style="list-style-type: none"> <li>• This syllabus document has some comparability with <i>Engineering Technology 2010</i>.</li> <li>• The course: <ul style="list-style-type: none"> <li>– is focused on practical activities that give students an opportunity to design and make systems with creativity and originality using a range of electronic, mechanical and pneumatic components</li> <li>– fosters an awareness of the need to consider sustainability and environmental impact of their designing.</li> </ul> </li> <li>• This is a practical subject area focused on Designing and Making skills.</li> <li>• The course sequence is influenced by the two assessments.</li> </ul>

Jurisdiction	Scope, organisation and description of learning
	<p><b>Graphics Products (GCSE 4550)</b></p> <ul style="list-style-type: none"> <li>This syllabus document is similar to the System and Control Technology (GSCE 4567) course in terms of design and delivery. It has some conceptual connections with <i>Graphics 2013</i>, however it is not an A-level subject. The course: <ul style="list-style-type: none"> <li>is focused on practical activities associated with the graphics discipline (e.g. materials, components, drawings)</li> <li>fosters students' awareness of the need to consider sustainability and environmental impact of their work.</li> </ul> </li> <li>This is a practical subject area focused on designing and making skills. The course sequence is influenced by the two assessments.</li> </ul>
	<p><b>Product Design (A-level 7551 and 7552 drafts)</b></p> <ul style="list-style-type: none"> <li>This syllabus document is similar to the (A-level 2550) and (A-level 2560) (see above) in terms of design and delivery. It has some comparability with <i>Technology Studies 2013</i> and <i>Home Economics 2010</i>.</li> <li>The course encourages creativity and originality through the creation of products using a range of materials. Packaging, labelling and instructions are encouraged as part of the complete design proposal and advertising.</li> <li>The evaluation of the commercial viability of products is also an important aspect of the course. This is something unique and has not been evident in comparative syllabuses in the Australian context. One of the biggest differences identified is that paper and card is used as the compulsory material. Students <i>must</i> study one other material and are encouraged to develop awareness of other materials.</li> <li>Evidence of designing can be submitted in a range of formats: A4/A3 folders, sketchbooks and electronically.</li> <li>Making is submitted as a working or non-working prototype.</li> <li>The course sequence is influenced by the two assessments.</li> </ul>
Singapore	Not applicable
NZ	<p><b>Technology: Senior Secondary New Zealand Curriculum Guide</b></p> <ul style="list-style-type: none"> <li>This syllabus document has some conceptual connections with <i>Technology Studies 2013</i> and <i>Home Economics 2010</i> and incorporates three strands: <ul style="list-style-type: none"> <li>Technological Practice — Students undertake own technological practice within a particular setting and reflect on the technological practice of others.</li> <li>Technology Knowledge — Students learn how technological modelling supports decision-making and how materials and systems enable technologies to function.</li> <li>Nature and Technology — Students learn why technologies are developed in the way they are and how technologies affect their and others' views, attitudes and lives.</li> </ul> </li> <li>The key concepts focus is on Innovation, Sustainability, Enterprise, and Design.</li> <li>Specialist knowledge and skills are aligned to contexts recognised as important to technology in New Zealand. These include: textiles, food, biological and chemical technology, manufacturing, design and visual communication, digital media, digital infrastructure, programming and computer science, electronics, digital information.</li> <li>As a consequence, the course entails: <ul style="list-style-type: none"> <li>three curriculum strands</li> <li>six specialist strands with 29 components, e.g. Digital technologies is a specialist strand with 12 components.</li> </ul> </li> </ul>



## 3.2 Recommendations

The current offerings in the syllabus documents reviewed have relevant content and offer core and elective learning comparable to other jurisdictions. All jurisdictions vary in their organisation of core and elective learning and the following are additional recommendations for each subgroup.

### **Recommendation 18: Information communication and technology subgroup**

*Information Processing and Technology 2010* and *Information Technology Systems 2012*

compare well with similar courses in other jurisdictions. While there are similarities in terms of course design, the approach to assessment is different. Given that Queensland will adopt a new approach to assessment that is in line with other states, it is recommended that the strategies applied in similar courses in national and international jurisdictions (considered in this review) be examined critically. This may be a valuable exercise in developing assessment strategies for the ICT courses in Queensland.

### **Recommendation 19: Home economics and hospitality subgroup**

The *Home Economics 2010* is unique in some respects. Apart from New Zealand, Queensland is the only jurisdiction that maintains this title. The emphasis is also different. New Zealand and Queensland syllabuses have a focus on food and textiles. If this approach is retained, it is recommended that the title of the syllabus be revisited. Perhaps a change from 'Home Economics' to 'Food and Textile Technology' may be more appropriate and more aligned with the current national and international trends.

Future offerings should also consider the learning in *WACE Materials, Design and Technology Syllabus* and VCE Product Design and Technology Study Design which are consistent with the textile product design process and focus in *Home Economics 2010*.

There were no comparable courses to *Hospitality Studies 2012*. However, in all Australian jurisdictions and New Zealand, the courses are delivered in a dual mode. Students gain VET and local state qualifications. When *Hospitality Studies 2012* is redeveloped it will be worthwhile to investigate the value of adopting such an approach in the syllabus.

### **Recommendation 20: Design subgroup**

The *Aerospace Studies 2011* syllabus in Queensland is unique. Apart from Western Australia, Queensland is the only state where such a course is offered. The content in both courses are comparable. However, there are some differences, which will be worth investigating. For example, the *WACE Aviation ATAR Syllabus* has more emphasis on the Social Sciences, Humanities and Environmental Science whereas in *Aerospace Studies 2011*, *Business and Law* — as they relate to the aerospace industry — are important content topics. It should be asked whether the incorporation of Environmental Science would add value to the Queensland syllabus.

The approach to assessment is different. For example, the *WACE Aviation ATAR Syllabus* is divided into a separate Year 11 and Year 12 syllabus. Year 11 is divided into two units; each one is a semester duration of 55 contact hours and as a point of difference are typically delivered as a pair. The type of assessment instruments used is different (and not negotiable) — practical examination (20%), investigation (10%), test (20%), and examination (50%). As a consequence, there are differences in expectations. It is recommended that the *WACE Aviation ATAR Syllabus* be looked at critically — especially where the approaches are different.

*Engineering Technology 2010, Graphics 2013, and Technology Studies 2013* are well placed when compared to similar courses in other jurisdictions. However, the approach to assessment is different — this has an influence on the course. As the new syllabuses are developed, it is recommended that the assessment strategies applied in similar courses in New South Wales, Victoria, Western Australia, and the United Kingdom be looked at critically. This may prevent 'reinventing the wheel'. While it is not recommended that they be adopted without critique and in full, there may be some valuable approaches that could add value to these subjects in Queensland.

## 4 Future focus: 21st century skills

Through its own initial research, QCAA has determined a set of 21st century skills that reflect current educational trends.

21st century skills	Elements
<b>Critical thinking</b>	<ul style="list-style-type: none"> <li>• analytical thinking</li> <li>• problem solving</li> <li>• decision making</li> <li>• reasoning</li> <li>• reflecting and evaluating</li> <li>• intellectual flexibility</li> </ul>
<b>Creative thinking</b>	<ul style="list-style-type: none"> <li>• innovation</li> <li>• initiative and enterprise</li> <li>• curiosity and imagination</li> <li>• creativity</li> <li>• generating and applying new ideas</li> <li>• identifying alternatives</li> <li>• seeing or making new links</li> </ul>
<b>Communication</b>	<ul style="list-style-type: none"> <li>• effective oral and written communication</li> <li>• using language symbols and texts</li> <li>• communicate ideas effectively with diverse audiences</li> </ul>
<b>Collaboration and teamwork</b>	<ul style="list-style-type: none"> <li>• relating to others (interacting with others)</li> <li>• recognising and utilising diverse perspectives</li> <li>• participating and contributing</li> <li>• making community connections</li> </ul>
<b>Personal and social skills</b>	<ul style="list-style-type: none"> <li>• adaptability/flexibility</li> <li>• management (self, career, time, planning and organising)</li> <li>• character (resilience, mindfulness, open- and fair-mindedness, self-awareness)</li> <li>• leadership</li> <li>• citizenship</li> <li>• cultural awareness</li> <li>• ethical (and moral) understanding</li> </ul>
<b>ICT skills</b>	<ul style="list-style-type: none"> <li>• operations and concepts</li> <li>• accessing and analysing information</li> <li>• being productive users of technology</li> <li>• digital citizenship (being safe, positive and responsible online)</li> </ul>

## 4.1 Implications for the revision of Queensland syllabuses in the subject group

### Authority syllabuses

#### Aerospace Studies 2011

The dimensions for this subject are:

- Dimension 1: Knowledge and understanding
- Dimension 2: Interpretation and communication
- Dimension 3: Critical thinking.

21st century skills	Comments
<b>Critical thinking</b>	One of three dimensions of current course (Dimension 3).
<b>Creative thinking</b>	<ul style="list-style-type: none"> <li>• Content provides opportunity to use creative thinking: The business of aviation and aerospace, e.g. Marketing mix.</li> <li>• Embedded in Dimension 2 as <i>Interpretation</i>.</li> </ul>
<b>Communication</b>	Component of one of the three dimensions of current course (Dimension 2).
<b>Collaboration and teamwork</b>	<ul style="list-style-type: none"> <li>• Assessment does not currently cater for collaboration and teamwork.</li> <li>• New assessment types could be developed which mirror how people interact in the aerospace industry (closer links with course and work).</li> </ul>
<b>Personal and social skills</b>	<ul style="list-style-type: none"> <li>• Implicit in current course.</li> <li>• Could include heightened emphasis on:               <ul style="list-style-type: none"> <li>– ethics, e.g. business ethics and awareness of other cultures in core subject matter</li> <li>– time management and project planning, e.g. as part of self-directed learning.</li> </ul> </li> </ul>
<b>ICT skills</b>	Need to be more explicit in course.

## Engineering Technology 2010

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and application
- Dimension 2: Investigative and analytical processes
- Dimension 3: Evaluation and technical communication.

21st century skills	Comments
<b>Critical thinking</b>	<ul style="list-style-type: none"> <li>• Represented as Dimension 2: <i>Investigative and analytical processes</i>.</li> <li>• Component of one of the three dimensions (Dimension 3). <i>Evaluation</i> requires critical thinking.</li> </ul>
<b>Creative thinking</b>	Content provides opportunity to use creative thinking: <i>Designing and Making</i> .
<b>Communication</b>	Component of one of the three dimensions of current course (Dimension 3: <i>Technical communication</i> ).
<b>Collaboration and teamwork</b>	Evident in suggested learning experiences.
<b>Personal and social skills</b>	<ul style="list-style-type: none"> <li>• Cultural awareness, evident in <i>Indigenous perspectives</i>.</li> <li>• Ethical understanding evident in approaches to content.</li> <li>• Time management and project planning, e.g. as part of self-directed learning.</li> </ul>
<b>ICT skills</b>	ICT skills are integral to design and technology subjects, as evident in <i>Suggested learning experiences</i> .

## Graphics 2013

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and understanding
- Dimension 2: Analysis and application
- Dimension 3: Synthesis and evaluation.

21st century skills	Comments
<b>Critical thinking</b>	<ul style="list-style-type: none"> <li>• Component of one of the three dimensions (Dimension 3). <i>Evaluation</i> requires critical thinking.</li> <li>• Evident in assessment: Design Folio; and Short and Extended response test.</li> </ul>
<b>Creative thinking</b>	Content and assessment provides opportunity to use creative thinking.
<b>Communication</b>	Evident in assessment, e.g. research can be presented in a variety of modes including written, spoken and/or multimodal.
<b>Collaboration and teamwork</b>	Opportunities to work collaboratively with people with different skillsets to resolve a design problem.
<b>Personal and social skills</b>	Evident in focus on time management, project planning and self-directed learning.
<b>ICT skills</b>	Explicit options to use computer-aided design and drafting (CADD) techniques to generate technical orthogonal and pictorial graphical representations; and to develop animations and simulations. This is in conjunction with manual skills.

## Home Economics 2010

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and understanding
- Dimension 2: Reasoning and communicating processes
- Dimension 3: Practical performance.

21st century skills	Comments
<b>Critical thinking</b>	<ul style="list-style-type: none"><li>• Evident in Dimension 2 through a focus on an <i>Inquiry approach</i> and <i>Reflection</i>.</li><li>• Evident in Dimension 3 with practical performance as endpoint of <i>Critical thinking</i> and <i>Reflection</i>.</li></ul>
<b>Creative thinking</b>	Evident in Dimension 2 and in the description of assessment tasks.
<b>Communication</b>	Evident in Dimension 2 and in assessment criteria.
<b>Collaboration and teamwork</b>	No reference to collaborative work apart from the opportunity to provide multilevel group work in composite classes.
<b>Personal and social skills</b>	Embedded in 'points of view', e.g. social/cultural, ethical, and political/legal.
<b>ICT skills</b>	Limited reference and use of ICT, i.e. restricted to websites and computer software listed as resources.

## Hospitality Studies 2012

The dimensions for a course in this subject are:

- Dimension 1: Inquiring
- Dimension 2: Planning
- Dimension 3: Performing.

21st century skills	Comments
<b>Critical thinking</b>	<ul style="list-style-type: none"><li>• Evident in Dimension 1, through research and synthesis.</li><li>• Evident in Dimension 2, through analysis, evaluation and the justification of decisions.</li></ul>
<b>Creative thinking</b>	Evident in Dimension 3, through creating products and/or providing services.
<b>Communication</b>	Evident in Dimension 1, through communication of inquiry findings.
<b>Collaboration and teamwork</b>	Opportunities for assessment in groups with caveats that assessment is of individual performance rather than of group outcomes.
<b>Personal and social skills</b>	Evident in Dimension 3, through the management of both human and non-human resources. Attention in content to workplace behaviours.
<b>ICT skills</b>	Limited reference to the use of ICT, i.e. in research and the employment of technologies used in hospitality settings.

## Information Processing and Technology 2010

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and application
- Dimension 2: Analysis and synthesis
- Dimension 3: Evaluation and communication
- Dimension 4: Attitudes and values.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimensions 2 and 3. Explicit requirement for analyses and appraisals to be critical, particularly in regard to solving problems. The software development cycle is used to structured project design. While central to working in IT, the terms 'computational thinking' and 'systems thinking' are not used in the syllabus. This should be considered in any syllabus redevelopment.
<b>Creative thinking</b>	Implicit in Dimension 3, in proposing alternate project plans or design solutions. While central to working in IT, the term 'design thinking' is not used in the syllabus. This should be considered in any syllabus redevelopment.
<b>Communication</b>	Evident in Dimension 3.
<b>Collaboration and teamwork</b>	Requisite in learning experiences, particularly in connection with project planning and in case studies.
<b>Personal and social skills</b>	Evident in Dimension 4. Focus on responsible and ethical behaviour.
<b>ICT skills</b>	Embedded in Dimension 1, in <i>Knowledge and application</i> , in Dimension 2, in <i>Analysing problems and offering solutions</i> ; and in Dimension 3, in <i>Testing solutions</i> .

## Information Technology Systems 2012

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and communication
- Dimension 2: Design and development
- Dimension 3: Implementation and evaluation.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimensions 2 and 3; and in elements, i.e. problem-solving process. An evaluation framework (CIPP: contexts, inputs, processes and products) is used to scaffold evaluation.
<b>Creative thinking</b>	Evident in Dimensions 2 and 3.
<b>Communication</b>	Evident in Dimension 1; embedded in Dimension 2 (in communication with clients).
<b>Collaboration and teamwork</b>	Opportunity to work in groups for projects and practical exercises.
<b>Personal and social skills</b>	Evident in elements, particularly project management and client relationships.
<b>ICT skills</b>	Embedded in Dimension 1, in knowledge, Dimension 2, in synthesising to design solutions and testing of solutions, and in Dimension 3, in implementation.

## Technology Studies 2013

The dimensions for a course in this subject are:

- Dimension 1: Analysing design problems
- Dimension 2: Applying design factors and communication
- Dimension 3: Synthesising and evaluating designs

21st century skills	Comments
<b>Critical thinking</b>	Evident in two dimensions of: Dimension 1 — <i>Analysing design problems</i> and Dimension 3 — <i>Synthesising and evaluating designs</i> .
<b>Creative thinking</b>	Content and assessment provides opportunity to use creative thinking: designing and making.
<b>Communication</b>	Evident in Dimension 2; implicit in Dimension 3. Communication includes visual and written formats. Spoken modes may also be considered (visual, written and oral).
<b>Collaboration and teamwork</b>	Assessment offers opportunities to work collaboratively on design problems. Content lends itself to working with people with different skillsets to resolve a design problem.
<b>Personal and social skills</b>	<ul style="list-style-type: none"><li>• Students investigate design problems from a variety of contexts, considering the needs of individuals and communities or responding to identified opportunities.</li><li>• Time management and project planning is part of self-directed learning and could feature more in course assessment.</li></ul>
<b>ICT skills</b>	Limited reference and use.



## Authority-registered syllabuses

### Building and Construction Skills 2015

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimension 3, in evaluation.
<b>Creative thinking</b>	Limited opportunities for creative thinking in assessment, i.e. projects, research or extended responses.
<b>Communication</b>	Opportunities to communicate using oral, written and graphical modes. The core content emphasises communication skills.
<b>Collaboration and teamwork</b>	Opportunities for group work (collaborative learning experiences). The core content emphasises teamwork skills.
<b>Personal and social skills</b>	Learning is designed around construction tasks that promote adaptable, competent, self-motivated and safe individuals who can work with colleagues to solve problems and complete practical work. Emphasis is placed on honest engagement, building trust and working with local community members.
<b>ICT skills</b>	Limited reference and use. Could be a greater component of <i>Community Connections</i> , group work and assessment techniques.

## Engineering Skills 2015

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimension 3, in evaluation. Evaluation is guided, e.g. for effectiveness, usability, functionality and suitability for the intended purpose.
<b>Creative thinking</b>	Assessment instruments provide some opportunities to assess creative thinking, e.g. projects. More self-directed open-ended tasks could be encouraged.
<b>Communication</b>	There are opportunities to communicate using oral, written and graphical modes. The core content emphasises communication skills, namely, interacting with visitors to the school, such as community representatives, building and construction industry experts, employers, employees and the self-employed.
<b>Collaboration and teamwork</b>	There are opportunities for students to work in teams: <ul style="list-style-type: none"> <li>• <i>Applied Learning</i> encourages students to work individually and in teams to complete tasks and solve problems.</li> <li>• Manufacturing tasks provide opportunities for collaboration and teamwork.</li> </ul>
<b>Personal and social skills</b>	Personal and interpersonal skills are represented in the core topic, <i>Industry Practices</i> . <i>Core Skills for Work (CSfW)</i> is an underpinning factor of the course.
<b>ICT skills</b>	Limited reference and use of ICT skills. Could be a greater component of <i>Community Connections</i> , group work and assessment techniques.

## Fashion 2014

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Evaluating and creating.

21st century skills	Comments
<b>Critical thinking</b>	<p>Evident in:</p> <ul style="list-style-type: none"> <li>• Dimension 1, particularly in the identification and interpretation of fashion fundamentals</li> <li>• Dimension 2, particularly in the analysis of fashion fundamentals</li> <li>• Dimension 3, particularly in the requirement to synthesise ideas and evaluate design ideas.</li> </ul> <p>Also evident in the designated design process: <i>Developing ideas and possible solutions</i>; <i>Exploring a design challenge</i>; and <i>Creating solutions and fashion items</i>.</p>
<b>Creative thinking</b>	<p>Evident in:</p> <ul style="list-style-type: none"> <li>• Dimension 1, particularly in the demonstrations of the elements and principles and technical skills</li> <li>• Dimension 3, particularly in the requirement to generate, modify and manage plans and processes; and to create design solutions.</li> </ul> <p>Also evident in the designated design process: <i>Developing ideas and possible solutions</i>; <i>Exploring a design challenge</i>; and <i>Creating solutions and fashion items</i>.</p>
<b>Communication</b>	<p>Evident in:</p> <ul style="list-style-type: none"> <li>• Dimension 1, particularly in explain design briefs</li> <li>• Dimension 2, particularly in the use of relevant language conventions</li> <li>• Dimension 3, particularly in the requirement to create communications that convey meaning to audiences.</li> </ul>
<b>Collaboration and teamwork</b>	Limited opportunity to work in groups (caveats on assessment of group work).
<b>Personal and social skills</b>	Outside of the underpinning developmental <i>Core Skills for Work Framework (CSfW)</i> , there is little evidence of attention to personal and social skills.
<b>ICT skills</b>	No apparent reference or apparent use — tangential reference to photographs/visual evidence and social media. An area requiring inclusion in any revision.

## Furnishing Skills 2015

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimension 3, in evaluation. Evaluation is guided, e.g. for effectiveness, usability, functionality and suitability for the intended purpose.
<b>Creative thinking</b>	Assessment instruments provide some opportunities to assess creative thinking, e.g. projects. More self-directed open-ended tasks could be encouraged.
<b>Communication</b>	There are opportunities to communicate using oral, written and graphical modes. The core content emphasises communication skills, namely, interacting with visitors to the school, such as community representatives, building and construction industry experts, employers, employees and the self-employed.
<b>Collaboration and teamwork</b>	There are opportunities for students to work in teams: <ul style="list-style-type: none"> <li>• <i>Applied Learning</i> encourages students to work individually and in teams to complete tasks and solve problems</li> <li>• manufacturing tasks provide opportunities for collaboration and teamwork.</li> </ul>
<b>Personal and social skills</b>	Personal and interpersonal skills are represented in the core topic, <i>Industry Practices</i> . <i>Core Skills for Work (CSfW)</i> is an underpinning factor of the course.
<b>ICT skills</b>	Limited reference and use. Could be a greater component of <i>Community Connections</i> , group work and assessment techniques.

## Hospitality Practices 2014

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Examining and applying
- Dimension 3: Planning and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 2, particularly in the examination of ideas and procedures</li> <li>• Dimension 3, particularly in the requirement to critique plans and procedures; and evaluation of industry practices.</li> </ul>
<b>Creative thinking</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 2, particularly in the application of ideas and procedures to create products and perform services</li> <li>• Dimension 3, particularly in the requirement to critique plans and processes.</li> </ul>
<b>Communication</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 1, particularly in explaining concepts and describing procedures</li> <li>• Dimension 2, particularly in the use of relevant language conventions.</li> </ul>
<b>Collaboration and teamwork</b>	Limited opportunity to work in groups (caveats on assessment of group work).
<b>Personal and social Skills</b>	Outside of the underpinning developmental <i>Core Skills for Work Framework (CSfW)</i> , there is little evidence of attention to personal and social skills.
<b>ICT skills</b>	No reference to the use of ICT. An area requiring inclusion in any revision.

## Industrial Graphics Skills 2015

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimension 3, through evaluating (which involves reflecting on industry practices, drafting processes and drawings to consider ways to improve future drafting tasks).
<b>Creative thinking</b>	Assessment and learning experiences offer some opportunities for creative thinking.
<b>Communication</b>	There are opportunities to communicate using oral, written and graphical modes. The core content emphasises communication skills, namely, interacting with visitors to the school, such as community representatives, building and construction industry experts, employers, employees and the self-employed.
<b>Collaboration and teamwork</b>	There are opportunities for collaboration. In particular: <ul style="list-style-type: none"> <li>• <i>Applied Learning</i> encourages students to work individually and in teams to complete tasks and solve problems (<i>Applied Learning</i>)</li> <li>• manufacturing tasks provide opportunities for collaboration and teamwork.</li> </ul>
<b>Personal and social skills</b>	Outside of the underpinning developmental <i>Core Skills for Work Framework (CSfW)</i> , there is little evidence of attention to personal and social skills.
<b>ICT skills</b>	Computer drafting skills are required to draw a range of 2D and 3D graphical representations. Knowledge is also required of computer peripherals.

## Industrial Technology Skills 2015

The dimensions for a course in this subject are:

- Dimension 1: Knowledge and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in Dimension 3, in evaluation. Evaluation is guided, e.g. for effectiveness, usability, functionality and suitability for the intended purpose.
<b>Creative thinking</b>	Assessment instruments provide some opportunities to assess creative thinking, e.g. projects. More self-directed open-ended tasks could be encouraged.
<b>Communication</b>	There are opportunities to communicate using oral, written and graphical modes. Communication is for particular purposes and may include pictorial sketches, working drawings, verbal descriptions of production procedures, material lists, risk assessments, job cards and forms.
<b>Collaboration and teamwork</b>	There are opportunities for students to work in teams: <ul style="list-style-type: none"> <li>• <i>Applied Learning</i> encourages students to work individually and in teams to complete tasks and solve problems</li> <li>• manufacturing tasks provide opportunities for collaboration and teamwork.</li> </ul>
<b>Personal and social skills</b>	Personal and interpersonal skills are represented in the core topic, <i>Industry Practices</i> . <i>Core Skills for Work (CSfW)</i> is an underpinning factor of the course.
<b>ICT skills</b>	Limited reference and use. Could be a greater component of <i>Community Connections</i> , group work and assessment techniques.

## Information and Communication Technology 2014

The dimensions for a course in this subject are:

- Dimension 1: Knowing and understanding
- Dimension 2: Analysing and applying
- Dimension 3: Producing and evaluating.

21st century skills	Comments
<b>Critical thinking</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 2, through the analysis of ICT problems to identify solutions</li> <li>• Dimension 3, through:               <ul style="list-style-type: none"> <li>– the synthesis of ICT concepts and ideas to plan solutions to given ICT problems</li> <li>– the evaluation of problem-solving processes and solutions, and make recommendations.</li> </ul> </li> </ul>
<b>Creative thinking</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 2, through the application of software and hardware concepts, ideas and skills to complete tasks in ICT contexts</li> <li>• Dimension 3, through the production of solutions that address ICT problems.</li> </ul>
<b>Communication</b>	Evident in: <ul style="list-style-type: none"> <li>• Dimension 1 through the identification and explanation of the use of ICT in society</li> <li>• Dimension 2, through the requirement to communicate ICT information to audiences.</li> </ul>
<b>Collaboration and teamwork</b>	Opportunity to undertake assessment in groups.
<b>Personal and social skills</b>	Outside of the underpinning developmental <i>Core Skills for Work Framework (CSfW)</i> , there is little evidence of attention to personal and social skills.
<b>ICT skills</b>	Embedded in Dimension 1, in knowledge and application; and as the content and context for Dimensions 2 and 3.



## 4.2 Recommendations

### Recommendation 21

The tables in the section above show that across all the subjects, elements of 21st century skills have already been incorporated to varying degrees. However, there are two skills — Collaboration and teamwork and ICT skills — that are lacking in a number of subjects. While there is some evidence of collaboration and teamwork in classroom activities, opportunities for students to demonstrate this skill in assignments is lacking. There is also a lack of explicit details on how students develop their ICT skills in many of the subjects. Thus, it is recommended that the syllabus redevelopment panels consider how students will develop and apply both these skills in their respective subjects, assignments and in the real world.

### Recommendation 22

Subjects associated with STEM need to incorporate 21st century skills in the design of real-world projects that draw up interdisciplinary knowledge and skills. This could be incorporated as part of either core or elective learning — depending on the subject.

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