

Digital Solutions General Senior Syllabus 2019 v1.1

Subject report 2020

February 2021

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Introduction

The first summative year for the new Queensland Certificate of Education (QCE) system was unexpectedly challenging. The demands of delivering new assessment requirements and processes were amplified by disruptions to senior schooling arising from the COVID-19 pandemic. This meant the new system was forced to adapt before it had been introduced — the number of summative internal assessments was reduced from three to two in all General subjects. Schools and the QCAA worked together to implement the new assessment processes and the 2020 Year 12 cohort received accurate and reliable subject results.

Queensland's innovative new senior assessment system combines the flexibility and authenticity of school-based assessment, developed and marked by classroom teachers, with the rigour and consistency of external assessment set and marked by QCAA-trained assessment writers and markers. The system does not privilege one form of assessment over another, and both teachers and QCAA assessors share the role of making high-stakes judgments about the achievement of students. Our commitment to rigorous external quality assurance guarantees the reliability of both internal and external assessment outcomes.

Using evidence of student learning to make judgments on student achievement is just one purpose of assessment. In a sophisticated assessment system, it is also used by teachers to inform pedagogy and by students to monitor and reflect on their progress.

This post-cycle report on the summative assessment program is not simply being produced as a matter of record. It is intended that it will play an active role in future assessment cycles by providing observations and findings in a way that is meaningful and helpful to support the teaching and learning process, provide future students with guidance to support their preparations for summative assessment, and promote transparency and accountability in the broader education community. Reflection and research are necessary for the new system to achieve stability and to continue to evolve. The annual subject report is a key medium for making it accessible to schools and others.

Background

Purpose

The annual subject report is an analysis of the previous year's full summative assessment cycle. This includes endorsement of summative internal assessment instruments, confirmation of internal assessment marks and external assessment.

The report provides an overview of the key outcomes of one full teaching, learning and assessment cycle for each subject, including:

- information about the application of the syllabus objectives through the design and marking of internal and external assessments
- information about the patterns of student achievement in each subject for the assessment cycle.

It also provides advice to schools to promote continuous improvement, including:

- identification of effective practices in the design and marking of valid, accessible and reliable assessments
- identification of areas for improvement and recommendations to enhance the design and marking of valid, accessible and reliable assessment instruments
- provision of tangible examples of best practice where relevant, possible and appropriate.

Audience and use

This report should be read by school leaders, subject leaders and teachers to inform teaching and learning and assessment preparation. The report is to be used by schools and teachers to assist in assessment design practice, in making assessment decisions and in preparing students for external assessment.

The report is publicly available to promote transparency and accountability. Students, parents, community members and other education stakeholders can learn about the assessment practices and outcomes for General subjects (including alternative sequences and Senior External Examination subjects, where relevant) and General (Extension) subjects.

Report preparation

The report includes analyses of data and other information from the processes of endorsement, confirmation and external assessment, and advice from the chief confirmer, chief endorser and chief marker, developed in consultation with and support from QCAA subject matter experts.

Subject data summary

Subject enrolments

- Number of schools offering the subject: 188.

Completion of units	Unit 1	Unit 2	Units 3 and 4*
Number of students completed	1822	1818	1928

*Units 3 and 4 figure includes students who were not rated.

Units 1 and 2 results

Number of students	Satisfactory	Unsatisfactory	Not rated
Unit 1	1822	103	2
Unit 2	1818	145	2

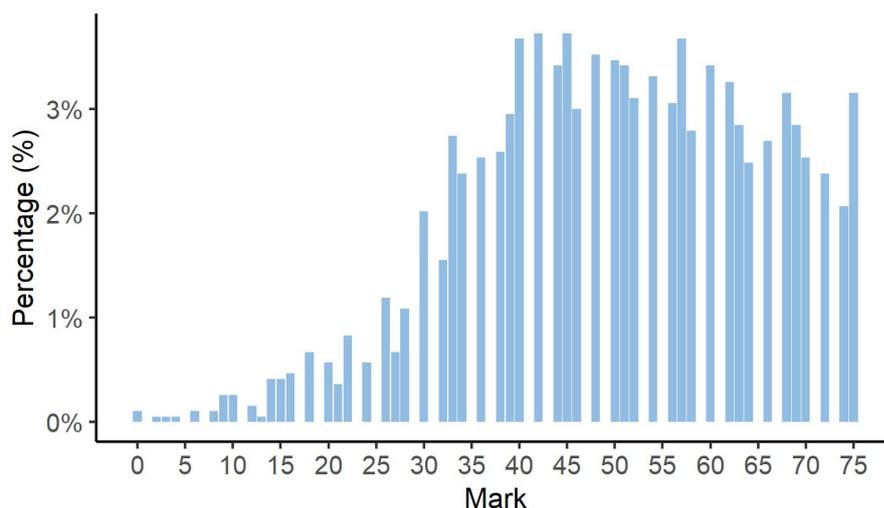
Units 3 and 4 internal assessment results

2020 COVID-19 adjustments

To support Queensland schools, teachers and students to manage learning and assessment during the evolving COVID-19 pandemic in 2020, the QCAA Board approved the removal of one internal assessment for students completing Units 3 and 4 in General and Applied subjects.

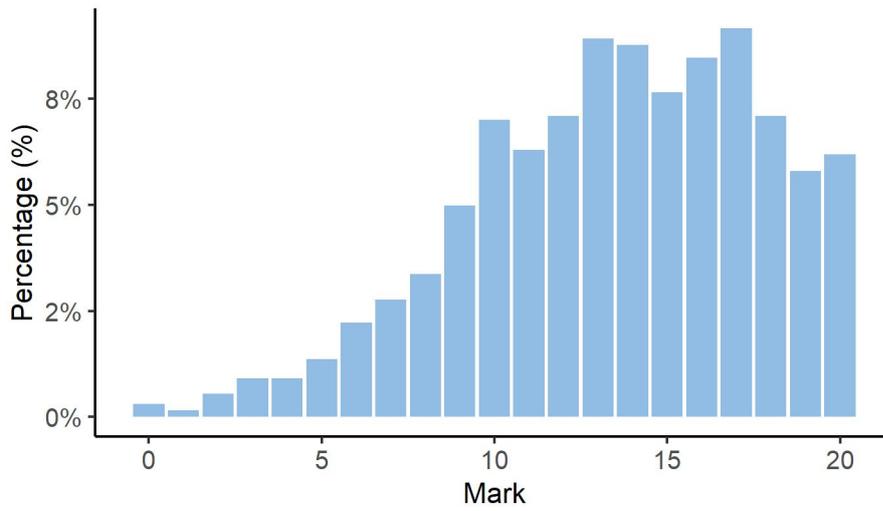
In General subjects, students completed two internal assessments and an external assessment. Schools made decisions based on QCAA advice and their school context. Therefore, across the state some instruments were completed by most schools, some completed by fewer schools and others completed by few or no schools. In the case of the latter, the data and information for these instruments has not been included.

Total results for internal assessment

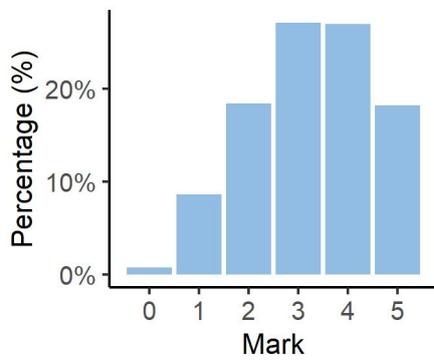


IA1 results

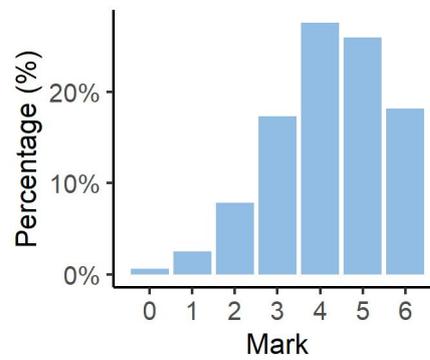
IA1 total



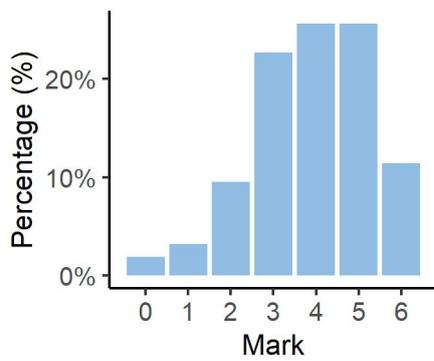
IA1 Criterion 1



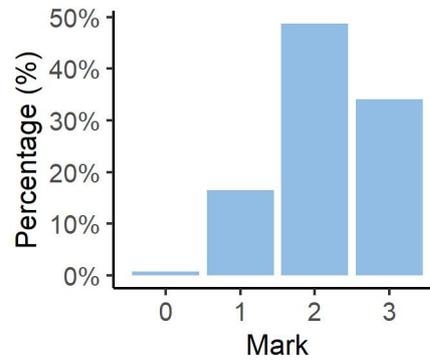
IA1 Criterion 2



IA1 Criterion 3

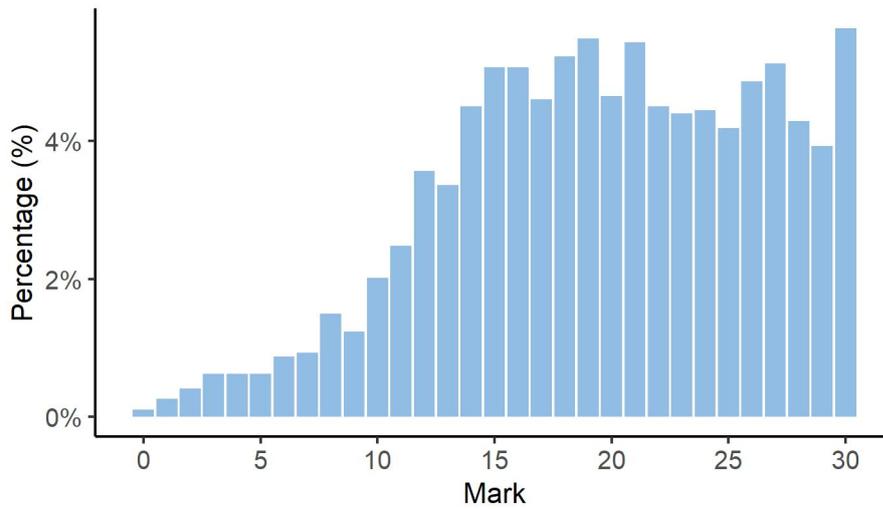


IA1 Criterion 4

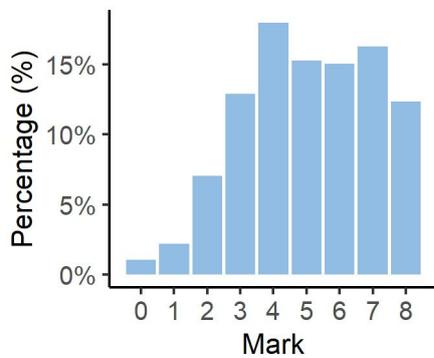


IA2 results

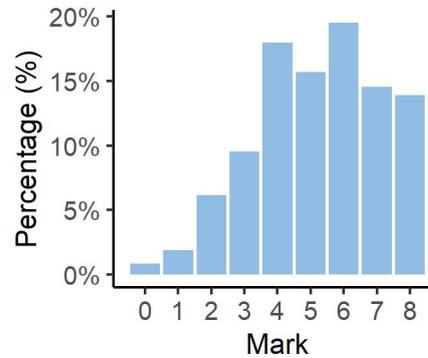
IA2 total



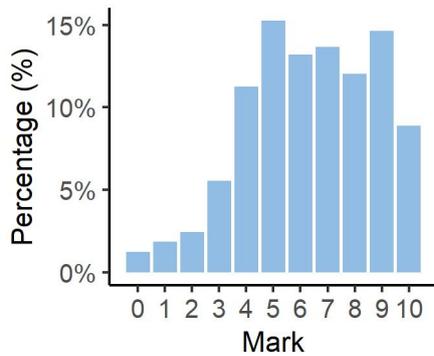
IA2 Criterion 1



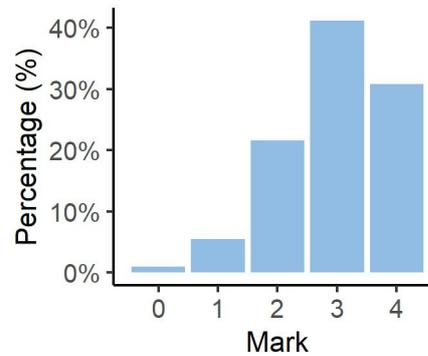
IA2 Criterion 2



IA2 Criterion 3



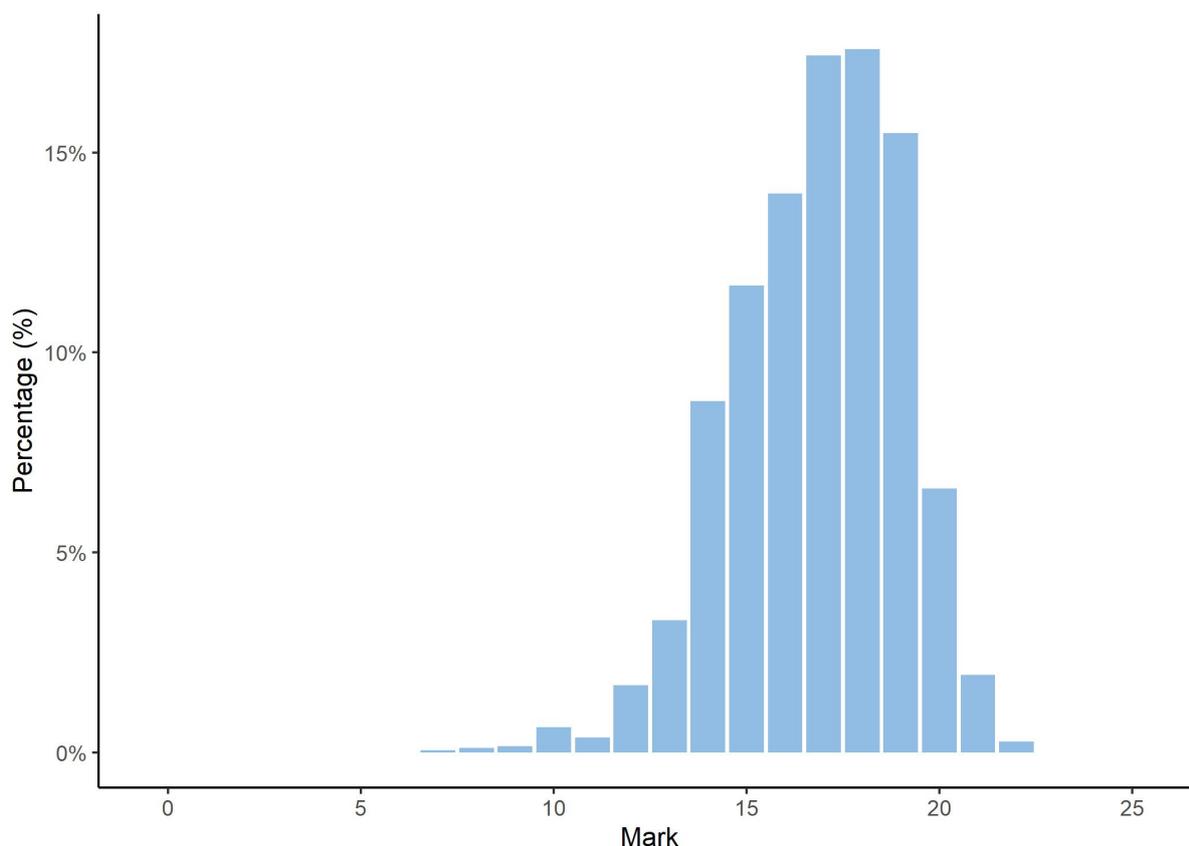
IA2 Criterion 4



IA3 results

Due to COVID-19 pandemic adjustments, there were insufficient student responses to this instrument to provide useful analytics.

External assessment results



Final standards allocation

The number of students awarded each standard across the state are as follows.

Standard	A	B	C	D	E
Number of students	428	599	728	146	5

Grade boundaries

The grade boundaries are determined using a process to compare results on a numeric scale to the reporting standards.

Standard	A	B	C	D	E
Marks achieved	100–82	81–66	65–44	43–17	16–0

Internal assessment

The following information and advice pertain to the assessment design and assessment decisions for each IA in Units 3 and 4. These instruments have undergone quality assurance processes informed by the attributes of quality assessment (validity, accessibility and reliability).

Endorsement

Endorsement is the quality assurance process based on the attributes of validity and accessibility. These attributes are categorised further as priorities for assessment and each priority can be further broken down into assessment practices. Data presented in the assessment design sections identifies the reasons why IA instruments were not endorsed at Application 1, by the priority for assessments. An IA may have been identified more than once for a priority for assessment, e.g. it may have demonstrated a misalignment to both subject matter and to the assessment objective. Refer to the quality assurance tools for detailed information about the assessment practices for each assessment instrument.

Total number of items endorsed in Application 1

Number of items submitted each event	IA1	IA2	IA3
Total number of instruments	193	193	193
Percentage endorsed in Application 1	54	44	27

Confirmation

Confirmation is the quality assurance process based on the attribute of reliability. Teachers make judgments about the evidence in students' responses using the instrument-specific marking guide (ISMG) to indicate the alignment of students' work with performance-level descriptors and determine a mark for each criterion. These are provisional criterion marks. The QCAA makes the final decision about student results through the confirmation processes. Data presented in the assessment decisions section identifies the level of agreement between provisional and final results.

Number of samples reviewed at initial, supplementary and extraordinary review

IA	Number of schools	Number of samples requested	Supplementary samples requested	Extraordinary review	School review	Percentage agreement with provisional
1	188	861	139	48	27	94.41
2	187	957	218	6	54	88.94

Internal assessment 1 (IA1)

Investigation — technical proposal (20%)

IA1 investigation — technical proposal allows the iterative exploration, development, generation and evaluation of ideas for a low-fidelity prototype digital solution to a real-world problem. This technique focuses on research and investigative practices to assess a range of cognitions in a particular technology context.

Students are expected to identify and use information beyond the scope of what they have been provided by the teacher. They identify and analyse a problem from both the user and developer perspectives. Students develop and synthesise ideas for a digital solution in a specific technology context. They evaluate and refine a low-fidelity prototype and generate a multimodal technical proposal to communicate the technical feasibility of the solution.

The multimodal presentation is submitted as a video file and demonstrates the dynamic convergence of two or more communication modes that demonstrate the assessable evidence required.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Validity priority	Number of times priority was identified in decisions*
Alignment	48
Authentication	5
Authenticity	26
Item construction	31
Scope and scale	11

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that featured:

- identification and provision of at least two accessible external data sources beyond the data provided to students, e.g. hyperlinks, screenshots, or samples of locally generated data
- scaffolding to address investigation conventions (Syllabus section 4.6.1)
- appropriate formatting of the multimodal presentation, including appropriate file types for submission.

Practices to strengthen

It is recommended that assessment instruments:

- are aligned to the IA1 assessment specifications, i.e. includes 'To complete this task, you must' (Syllabus section 4.6.1)
- clearly identify the selected technology context in the task description, e.g. web applications, mobile applications or interactive media or intelligent systems (Syllabus section 4.1)
- avoid repeating task information across sections
- provide a sufficiently detailed description of the real-world problem as it applies to the selected technology context
- refer to the problem-solving process using the information (Syllabus section 1.2.4).

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment — accessibility practices

Accessibility priority	Number of times priority was identified in decisions*
Transparency	4
Language	10
Layout	1
Bias avoidance	1

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that featured:

- clear instructions, with language that aligned to the syllabus, e.g. made explicit reference to specifications, cognitions and subject matter
- equitably and accessibly written instructions.

Practices to strengthen

It is recommended that assessment instruments:

- use the language of the Digital Solutions problem-solving process (Syllabus section 1.2.4) and not include 'design or designing', as these concepts are not defined
- provide contexts that are accessible to students, such as those that relate to the real world and that require students to apply syllabus subject matter without placing students in professional roles.

Assessment decisions

Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and final results

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional
1	Retrieving and comprehending	94.07	5.07	0.86
2	Analysing	94.02	5.58	0.41
3	Synthesising and evaluating	93.72	5.73	0.56
4	Communicating	95.84	2.84	1.32

Effective practices

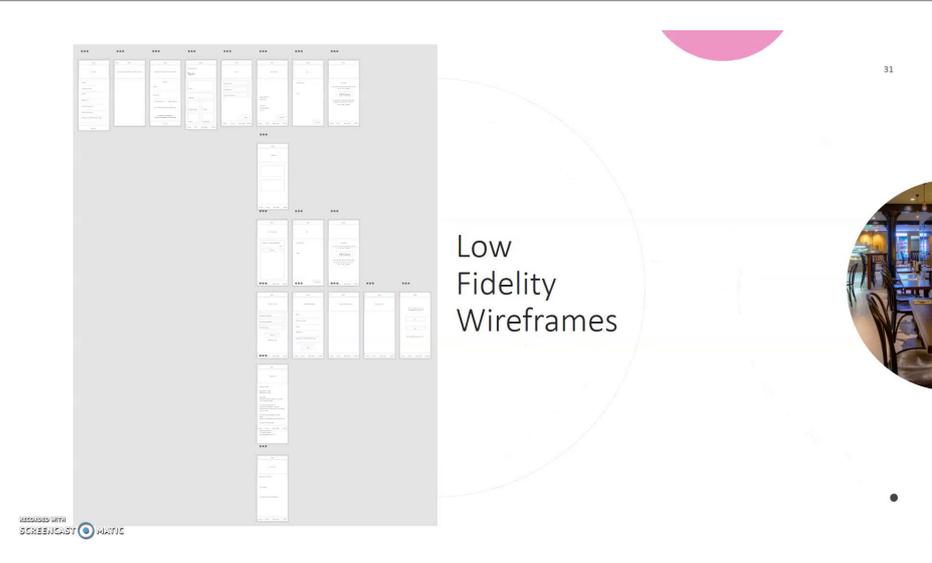
Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- evidence in student work aligned to the descriptors in the Retrieving and comprehending criterion, e.g. accurate recognition and discerning description of data sources, programming elements and useability principles
- for Analysing, the qualifier *astute* was matched to responses for the determination of essential prescribed and self-determined criteria
- for Synthesising and evaluating, the qualifier *critical* was matched to responses for the evaluation of impacts, components and low-fidelity prototypes against effective prescribed and self-determined criteria to make refinements and astute recommendations justified by data
- evidence in student work aligned to the descriptors in the Communicating criterion, e.g. decision-making and use of language for a technical audience and investigation conventions.

Samples of effective practices

The following is an excerpt from a response that illustrates the characteristics for the criteria at the performance level indicated. The sample may provide evidence of more than one criterion. The characteristics highlighted may not be the only time the characteristics have occurred throughout the response.

Retrieving and comprehending (7–8 marks)
The response demonstrates accurate recognition and discerning description of user-interface components and useability principles.



Synthesising and evaluating (5–6 marks)

The response demonstrates critical evaluation of impacts, components and low-fidelity prototypes against effective prescribed and self-determined criteria to make refinements and astute recommendations justified by data.

Response and Changes

- Adding the food and drinks menu to the application.
- Completing the 'about us' and 'payment' pages.
- Adding photos which are related to the café.
- The specials page will be removed as the café is not interested in providing further discounts (see the interview with the café's manager).
- Use icons in the tab bar navigator on the bottom of each page to improve the applications overall design.

RECORDED WITH
SCREENCAST
MAGIC

Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG in this IA, it is recommended that:

- for Synthesising and evaluating, when matching evidence to descriptors, attention should be given to
 - research or investigative practices, as specified in Syllabus section 4.6.1, for determining *data elements*, *user interface* and *algorithm components*
- for Communicating, when matching evidence to descriptors, attention should be given to
 - qualifiers, cognitions and assessment specifications to determine the evidence that would be expected in student responses at each level, especially for decision-making about and use of referencing
 - task conditions and managing response length in accordance with Section 8.2.6 of the *QCE and QCIA policy and procedures handbook*
 - syllabus conventions (Syllabus section 1.2.5) and supporting documents for pseudocode and data flow diagrams
- making judgments be informed by the relationship between criteria, e.g. without first achieving a high level in Retrieving and comprehending, it is unlikely for a response to achieve a higher level in other criteria, especially Analysing, Synthesising and evaluating.

Internal assessment 2 (IA2)

Project — digital solution (30%)

IA2 project — digital solution allows the iterative exploration, development, generation and evaluation of prototype digital solution components. Students demonstrate synthesis of information and ideas to determine elements and components of a digital solution.

In this technique, teachers supply a technical proposal stimulus to identify a specific problem, user interactions and component specifications aligned to the same technology context selected for IA1. The response requires documentation to demonstrate application of the problem-solving process and a video component to demonstrate the functionality of the user interface, data and coded components.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment — validity practices

Validity priority	Number of times priority was identified in decisions*
Alignment	66
Authentication	1
Authenticity	11
Item construction	38
Scope and scale	8

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that featured:

- the same Unit 3 technology context as IA1
- a detailed technical proposal PDF attachment with headings and content aligned with Syllabus section 4.6.2. These are
 - ‘Identification’, which clearly identifies the real-world need and is consistent with the task description
 - ‘Interactions’, which identifies user needs and how the digital solution will interact with external entities
 - ‘Component specifications’, which provides clear reference to data input and output, user interface/experience and code requirements
- resources appropriate to the selected technology context, e.g. a list of programming tools and IoT/robotic sensors relevant to the problem.

Practices to strengthen

It is recommended that assessment instruments:

- maintain alignment to the assessment specifications for, 'To complete this task, you must' (Syllabus section 4.6.2)
- include the technical proposal as a PDF attachment only, as opposed to copying and pasting the technical proposal into the stimulus section
- be sufficiently different from the sample assessment task to allow unique student responses, e.g. if a web application context is selected, that wave datasets are not used and that the identified problem, interactions and component specifications are different from the sample task
- include working hyperlinks or high-quality, legible images for supporting materials to help define scope and scale, e.g. through providing a specific dataset for students.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment — accessibility practices

Accessibility priority	Number of times priority was identified in decisions*
Transparency	1
Language	11
Layout	9
Bias avoidance	5

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that featured:

- clear and unambiguous instructions, e.g. explicit information to identify how students will access data, especially where data are generated locally or through sensors.

Practices to strengthen

It is recommended that assessment instruments:

- use accessible user personas free from bias or inappropriate features.

Additional advice

- Avoid copying and pasting directly into the Endorsement application when constructing a task without first removing all formatting data. Preview the task before submitting for review to ensure page breaks do not adversely affect the flow of information.

Assessment decisions

Reliability

Reliability is a judgment about the measurements of assessment. It refers to the extent to which the results of assessments are consistent, replicable and free from error.

Agreement trends between provisional and final results

Criterion number	Criterion name	Percentage agreement with provisional	Percentage less than provisional	Percentage greater than provisional
1	Retrieving and comprehending	86.19	13.45	0.36
2	Analysing	89.72	10.02	0.26
3	Synthesising and evaluating	85.2	14.02	0.78
4	Communicating	94.65	4.93	0.42

Effective practices

Accuracy and consistency of the application of the ISMG for this IA was most effective when:

- for Analysing, the qualifier *insightful* was matched to responses for the analysis of the problem and relevant contextual information to identify the essential elements and features of user-interface, data and programmed components and their relationships to the structure of the low-fidelity prototype digital solution.

Samples of effective practices

The following is an excerpt from a response that illustrates the characteristics for the criteria at the performance level indicated. The sample may provide evidence of more than one criterion. The characteristics highlighted may not be the only time the characteristics have occurred throughout the response.

Analysing (7–8 marks)
The mind map and self-determined criteria in this response show evidence of insightful analysis of the problem and relevant contextual information. These demonstrate relationships in a complex situation, informed by observation and deduction.

Self-determined criteria (SC) constructed during problem analysis and later throughout the life of the project.

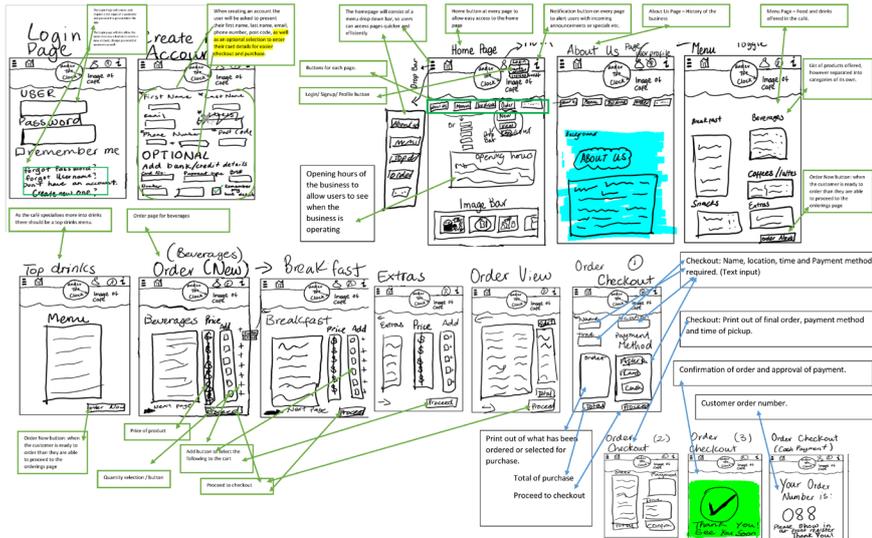
- Accuracy of code
- Efficiency of code
- Application of usability principles (accessibility, effectiveness, safety, ability, learnability)
- Impacts (evaluate) ... personal, social, economic, legal, ethical
- Does the app enable access on any sort of smartphones?
- Can users view the product easily?
- Does the image match the app?
- Does the page in the app work?
- Is there a login/sign up the ordering page? Does it work?
- Does the app include price, image, product and other details required?
- Is there a phone number posted somewhere in the app?
- Is there a policy involved in the app?
- Does the app use GIF? GIFs add and elements for aesthetic pleasures?
- Is there loading boxes included to allow customers to see when the call is operating?
- Is there a home button accessible in all pages and from every page?
- Are customers able to see an alert when they are trying to order a product?
- Is the app safe to use?
- Are the colours of text, button and images visible?
- Are users able to zoom into an image if unable to see?
- Are the buttons navigated to the correct page?

Analysing (7–8 marks)

The wireframes and annotations in this response show evidence of insightful analysis of the problem and relevant contextual information to identify the essential elements and features of user interface, with astute determination of the user interface through accurately assessing situations and personas.

Development – User Interface

Wireframe: 'an image or set up of images which displays the functional elements of a website or page, typically used for planning a site's structure and functionality.' (OxfordDictionary, 2020)



Practices to strengthen

To further ensure accuracy and consistency of the application of the ISMG in this IA, it is recommended that:

- for Retrieving and comprehending, when matching evidence to descriptors, attention should be given to
 - syllabus conventions (Syllabus section 1.2.5) and supporting resources for symbolisation of data flow diagrams and algorithms
 - the distinction between useability, user experience, and visual communication elements and principles
- for Analysing, when matching evidence to descriptors, attention should be given to
 - the individual qualifiers for the determination of *user interface*, *data*, *programmed and solution requirements* of the digital solution and *prescribed* and *self-determined criteria*. It is possible for a response to demonstrate elements at varying performance levels, such as '*astute* determination of *user interface*' and '*logical* determination of *data*'
- for Synthesising and evaluating, when matching evidence to descriptors, attention should be given to
 - the required inclusion of the video assessment component about the generation and understanding of the digital solution
 - the evaluation of 'impacts' (social, personal and economic) and justification of recommendations
- for Communicating, when matching evidence to descriptors, attention should be given to
 - syllabus conditions for time limits and page ranges. By exceeding the conditions, students are not displaying 'discerning decision-making about, and fluent use of, project conventions'
 - project conventions as stipulated in the syllabus specifications (Syllabus section 4.6.2).

Internal assessment 3 (IA3)

Project — folio (25%)

IA3 project — folio is a collection of work in three parts. Part 1 demonstrates research and investigative practices, Part 2 demonstrates development of ideas, and Part 3 evaluates security impacts related to data exchange. Together, Parts 1, 2 and 3 demonstrate application of the iterative problem-solving process.

There is no requirement to specify a technology context for this assessment instrument. The response requires documentation to demonstrate application of the problem-solving process and a video component to demonstrate the functionality of the user interface, data and coded components.

Assessment design

Validity

Validity in assessment design considers the extent to which an assessment item accurately measures what it is intended to measure and that the evidence of student learning collected from an assessment can be legitimately used for the purpose specified in the syllabus.

Reasons for non-endorsement by priority of assessment — validity practices

Validity priority	Number of times priority was identified in decisions*
Alignment	114
Authentication	2
Authenticity	9
Item construction	29
Scope and scale	8

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Validity priorities were effectively demonstrated in assessment instruments that featured:

- appropriate scope and scale, e.g. limiting focus to either the client or the server aspects of data exchange and clearly identifying the data exchange problem.

Practices to strengthen

It is recommended that assessment instruments:

- maintain alignment to the assessment specifications for, 'To complete this task, you must' (Syllabus section 5.6.1)
- align to Unit 4 subject matter, e.g. JSON/XML data structures and APIs
- provide clear instructions with language that aligns to the syllabus
- include the technical proposal as a PDF attachment only. Even if only part of a technical proposal is provided as stimulus, it should be attached as a PDF file to maintain consistency with other IAs. Technical proposal components, whether in part or in full, should not be copied and pasted into any sections of the task, including the stimulus section.

Accessibility

Accessibility in assessment design ensures that no student or group of students is disadvantaged in their capacity to access an assessment.

Reasons for non-endorsement by priority of assessment — accessibility practices

Accessibility priority	Number of times priority was identified in decisions*
Transparency	4
Language	11
Layout	3
Bias avoidance	2

*Total number of submissions: 193. Each priority might contain up to four assessment practices.

Effective practices

Accessibility priorities were effectively demonstrated in assessment instruments that featured:

- clear instructions using language accessible to a Year 12 student, e.g. generic terms that align with the syllabus instead of industry jargon.

Practices to strengthen

It is recommended that assessment instruments:

- select data sources that contain appropriate content, e.g. avoid datasets that may affect student wellbeing.

Assessment decisions

Due to COVID-19 pandemic adjustments, there were insufficient student responses to this instrument to provide useful analytics.

External assessment

Combination response — Examination (25%)

Assessment design

Assessment specifications and conditions

The examination includes a combination of one extended response, a number of short response and/or multiple-choice questions. Extended response is constructed using one item; the item is a response to an unseen problem based on stimulus material and requires sustained analysis, synthesis and evaluation to fully solve a problem. Short response consists of a number of items that ask students to respond to activities, including sketching, labelling or interpreting tables or diagrams, multiple-choice, sentence or short-paragraph responses, writing and calculating using algorithms as well as responding to unseen stimulus materials.

Where applicable, students are required to write in full sentences, constructing a response so that ideas are maintained, developed and justified. Students have a total of 2 hours plus perusal (15 minutes) to respond to all questions.

The assessment instrument consisted of three sections. Questions were derived from the context of Unit 4, Topics 1, 2 and 3. This assessment was used to determine student achievement in the following assessment objectives:

1. recognise and describe programming elements, components of exchange systems, privacy principles and data exchange processes
2. symbolise and explain programming ideas, data specifications, data exchange processes, and data flow within and between systems
3. analyse problems and information related to a digital problem
5. synthesise information and ideas to determine possible low-fidelity components of secure data exchange solutions
7. evaluate impacts, components and solutions against criteria to make refinements and justified recommendations.

The stimulus included a range of low-fidelity digital solution components and scenarios, which were designed to elicit opportunities for analysis and evaluation.

Section 1 was 10 multiple-choice questions where students were required to select a correct response from a range of responses.

Section 2 was 3 short response questions where students were required to respond in paragraphs consisting of full sentences with 50–250 words, diagrams with annotations and algorithms symbolised with pseudocode.

Section 3 was 1 an extended response question where students were required to symbolise algorithms with pseudocode and respond in paragraphs consisting of full sentences with 400 or more words.

Assessment decisions

Overall, students responded well to the following assessment aspects:

- recognise and describe how useability principles are used to inform solution development
- symbolise representations of a digital solution
- symbolise algorithmic steps as pseudocode.

Effective practices

The following samples were selected to illustrate highly effective student responses in some of the assessment objectives of the syllabus.

Multiple-choice item response

Short response

Item: 11b

This question required students to synthesise information and ideas to determine relevant elements and principles in response to stimulus. Students were expected to symbolise specific user-interface features that reflect the existing style/visual code established by the stimulus for consistency and visual harmony.

Effective student responses:

- recognised how elements and principles of visual communication can be used to further develop an existing user interface
- symbolised the five required user-interface features that accurately aligned with the existing interface in the stimulus.

Student sample/s of effective responses

This excerpt has been included to:

- demonstrate symbolisation of the five required user interface features that accurately align with the existing interface in the stimulus.

High level response (5 marks)
The response demonstrates symbolisation of the five required user interface features that align with the visual style of existing user-interface features.

The diagram shows a hand-drawn cockpit instrument panel. On the left, there is a heading indicator with 'W', 'N', 'E', 'S' directions. Below it is an altitude gauge with a needle pointing to '990'. Further down is a temperature gauge labeled 'Temperature / You' with a scale from -60 to 60. At the bottom left is a battery level indicator showing '60%' and a battery icon. In the center, there is a 'Flight Angle' gauge with a needle pointing to '60°' and a 'Pitch' label. On the right, there are two camera displays labeled 'Cam 1' and 'Cam 2'. 'Cam 1' shows a view of the ground with '20m/hr' speed and '10rpm' rotation. 'Cam 2' shows a similar view with '20m/hr' speed and '35rpm' rotation. The entire diagram is drawn in a sketchy, hand-drawn style with various lines and annotations.

Item: 12b

This question required students to analyse the stimulus to determine other factors that influence the effectiveness of the proposed solution. Students were expected to retrieve subject matter

knowledge to determine additional criteria for success appropriate to the problem and proposed solution.

Effective student responses:

- analysed problems and information to determine two additional, valid criteria to appraise the implementation of a data exchange solution, e.g. protection, security and interactions
- correctly evaluated the proposed solution against the stated criteria.

Student samples of effective responses

This excerpt has been included to:

- demonstrate stating two additional, valid criteria for evaluating the maintainability, efficiency, effectiveness and/or useability of the stimulus prototype solution

<p>High level response (4 marks) The response states two valid criteria for evaluating the maintainability, efficiency, effectiveness and/or useability of the stimulus prototype solution.</p>	<p>Criterion: <i>Efficiency</i> - Since some of the data is not provided by the marker, users will have to manually record and input that data into the database, reducing the efficiency of the data collection process</p> <p>Criterion: <i>Effectiveness</i> - The data collection is not very effective as it does not fully utilise provided information by the marker - such as the date and time of when faults are recorded.</p>
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Item: 13b

This question required students to analyse the stimulus to determine algorithmic steps required to manipulate data and synthesise stimulus and subject matter knowledge to develop a low-fidelity solution. Students were expected to express logical algorithms with pseudocode and/or SQL, following syllabus conventions for either format.

Effective student responses:

- synthesised information and ideas to symbolise the basic constructs of an algorithm, including assignment, sequence, selection, condition, iteration and modularisation to determine possible low-fidelity components of secure data exchange with pseudocode
- solved the problem without logic and syntax errors.

Student sample/s of effective responses

This excerpt has been included to:

- demonstrate accurate symbolisation of algorithmic steps following syllabus conventions for pseudocode and SQL.

**High level response
(4 marks)**

Response demonstrates accurate symbolisation of algorithmic steps following syllabus conventions for pseudocode and SQL.

```
BEGIN
INPUT current_date as current date in form yyyy-mm-dd
SELECT id, join_date
FROM members-activity
WHERE current_date - join_date >= 10
SORT asc (join_date)
END
```

Extended response

Item: 14b

This question required students to analyse the stimulus, retrieve and use subject matter knowledge to evaluate the proposed solution and determine relevant useability and user-experience requirements/considerations. Students were expected to determine how useability should be implemented with justification.

Effective student responses:

- analysed problems and information to evaluate impacts and components against useability principles to make justified recommendations to improve data security, based on accurate and discriminating recognition of how useability principles are used to inform solution development
- stated, described and justified two relevant useability principles in relation to the solution.

Student sample/s of effective responses

This excerpt has been included to:

- demonstrate accurate and discriminating recognition and description of how useability principles are used to inform solution development.

High level response (6 marks)

The response demonstrates accurate and discriminating recognition and description of how useability principles are used to inform solution development.

The response states, describes and justifies two respective useability principles.

In making this solution publicly available on a website, an important useability principle that must be satisfied is the criteria of accessibility. This implies that this website should allow users to access it through the use of any device (ipad, phones, ~~many~~ computers, etc.). By doing this, it broadens the amount of users who can use this ~~op website~~ website. This user interface must be responsive; meaning that the ~~size~~ ^{size} of the images and text must adapt to the size of the computer or phone screen. Furthermore, regardless of the screen size, the ~~ad~~ ^{size of the} elements of the user interface must still remain an appropriate size in relation to each other (e.g. images should be bigger than the normal text, headings should be in the centre and be big and bolded, etc.)

Another useability function is learnability; including familiar colours or shapes to correlate to their purposes. For example, using green boxes with the word 'next' or 'confirm' to indicate that the users will proceed to the next page / section. Similarly, using a red ~~box~~ ^{cross} to indicate that the users will cancel their current activity on the site. These familiar process will allow users to adapt and thus ~~now~~ navigate through the website more easily and comfortably.

Adopting these 2 useability principles will surely optimise the user experience on the website.

Practices to strengthen

It is recommended that when preparing students for external assessment, teachers consider:

- differentiating between elements and principles of visual communication and useability principles
- developing students' skills in justifying symbolised representations of user-interface features against elements and principles of visual communication
- providing further practice in analysing stimulus information to effectively evaluate the reliability and accuracy of a proposed digital solution by recognising factors and risks that affect data security, integrity, availability and privacy
- providing more opportunities for analysing problems and information related to a digital problem to symbolise algorithmic steps that recognise input, process, output and basic programming constructs
- further developing students' ability to analyse problems and information related to a digital problem to evaluate and make justified recommendations related to the security impacts of digital solutions, taking into consideration changes in interactivity and ways information and data are created, used and shared, with understanding of symmetric and asymmetric encryption algorithms, which includes DES, 3DES, AES, Blowfish, Twofish and RSA.