

Design and Technology

2014 Chief Assessor’s Report

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## Overview

Chief Assessors’ reports give an overview of how students performed in their school and external assessments in relation to the learning requirements, assessment design criteria, and performance standards set out in the relevant subject outline. They provide information and advice regarding the assessment types, the application of the performance standards in school and external assessments, the quality of student performance, and any relevant statistical information.

## School Assessment

Assessment Type 1: Skills and Applications Tasks

Typically, this assessment type featured two specialised skills applications and one materials application. This combination varied depending on school and class requirements.

The assessment design criteria required for this assessment are:

* investigating
* planning
* producing
* evaluating.

Please note the different assessment requirements for the 10-credit subject. However, while the number of tasks varies, the same assessment principles apply.

Specialised Skills Application

The moderation panel noted that many successful student responses resulted from task designs that:

* had clearly defined performance standards from the above assessment design criteria
* maximised the ‘spirit’ and intention of this assessment type
* did not over-assess, and thereby limited unnecessary dilution of the student response relative to the overall course weighting.

The most successful specialised skills tasks addressed learning requirements 2, 3, and 5, and assessed only the specific features Pr1, Pr2, and Pr3 of the producing assessment design criterion. This was evident over all three focus areas: communication products, material products, and systems and control products.

Successful specialised skills responses also featured task designs that reflected the rigour required at Stage 2, while preparing students for sophisticated responses in Assessment Type 2: Product. For example, for communication products, many successful photography students were given opportunities to develop a range of camera or imaging skills and knowledge. These tasks then helped scaffold and focus student ideas and subsequent design solutions. While for material products, students were often provided opportunities to develop skills and knowledge in joining systems, marking out, measuring, machining processes, assembly, and material preparation as excellent preparation for Assessment Type 2: Product.

Many of these tasks were scaffolded carefully by the teacher to provide access to materials or components, which may have been considered for the material applications task.

Importantly, student engagement was supported by clear evidence of completion, typically a series of images, CAD renders, orthogonal drawings, or 3D printed prototypes. In addition, clear assessment rubrics, concise task sheets, and a set of grades were indicative of organised curriculum delivery across the class.

The range of successful specialised skills tasks over all three focus areas was exhaustive, but the common feature of those where students achieved highly against the criteria was that they provided scaffolded preparation for later assessment types.

Materials Application

The moderation panel noted that there were many highly accomplished and sophisticated responses to this task, and that there has been significant improvement in student engagement in recent years.

Typically these tasks featured learning requirement 3, and used specific features I1, I3, I4 (investigating), Pl3 (planning), and E3 (evaluating), thus completing the assessment design criteria requirements for this assessment type.

Successful student responses were typically carefully targeted towards the design and ultimate realisation of Assessment Type 2: Product, and therefore also assisting in the preparation of Assessment Type 3: Folio, particularly specific feature I4. There is clearly a significant advantage to students who ‘value added’ to their course completion in this manner. It would seem that students choosing relevant materials to be tested in a meaningful manner could see the purpose of the task.

The moderation panel noted that exemplary task design typically required students to:

* identify materials and components for use or consideration in Assessment Type 2: Product
* state goals and aims for the material applications task (that is, students had to clearly identify the relevance of the testing and analysis)
* thoroughly describe materials and components, including characteristics and common uses
* include a description (e.g. chemical, botanical, digital) of the materials or components relevant to the task (examples include: for thermoset/thermoplastic analysis, including diagrammatic representations of the differences of thermosets which demonstrate the highly cross-linked polymers that have a molecular mesh or network of polymer chains, as opposed to thermoplastic counterparts; the differing cell structures of pored and non-pored timbers; the variations of coding between Java booleans and arrays)
* identify appropriate testing, such as testing relevant to the intended use
* include tests which were designed and executed, and include procedural information, such as the apparatus used and method adopted
* record tests and results using a range of reporting media, including photographic images/videos, tables, and graphing
* analyse test results and make recommendations or conclusions.

Importantly, this task:

* must remain within the 800-word count, in keeping with the SACE Board word-count policy.
* should use several images and diagrams to communicate properties, characteristics, testing procedures, testing results, etc.
* should include at least two tests; some included one qualitative and one quantitative for depth of testing and analysis.

The moderation panel identified many successful tasks; for example, one student response included:

* concise identification of materials
* the testing of three different adhesives to glue wood to ABS plastic for use in model making
* the preparation of three 3D printed blocks designed to be glued to a strip of wood (held in a vice) with three different glues and hooked to a pulling-force sensor linked to a data logger and computer to gauge and graph results
* comprehensive photographic evidence of the subsequent testing regimes
* a table of resulting data formatted and graphed
* evaluative comments linked to the application of the designed product in Assessment Type 2.

Curriculum design that links Assessment Type 1 to the development of Assessment Type 2 helps to promote individual, inquiry-type learning, and promotes student engagement and ownership in intended outcomes, and also prompts efficient use of delivery time. It was also clear that excellent results were facilitated by close, appropriate teacher–student partnerships. The moderation panel identified that successful courses were designed to maximise student potential by organisationally providing thinking, negotiating, and developing time in the very early stages of the course.

Assessment Type 2: Product

Students create one minor and one major product, each supported by a product record. This assessment type typically assessed learning requirements 1, 2, 3, 4, and 5, using the required assessment design criteria of Pr1, Pr2, Pr3, Pl3, and E2.

Please note the different assessment requirements for the 10-credit subject. The same principles of assessment apply; however, only one product is required, and therefore only one product record.

Major and Minor Products

For a 20-credit course, there remains no formal delineation between major and minor products within the assessment type, and both require a product record (see ‘Product Records’ below). However, the moderation panel noted that many successful student responses against the criteria were as a result of the major and minor products being linked, or in fact being part of the same final product. Examples included:

* the building and coding (using server-side technology) for a feedback sheet within a website as the minor product, with the website itself as the major product
* a ‘how to use/play’ navigational video for a video game as the minor product, with the game itself as the major product.
* a drawer as the minor product, with the cabinet as the major product.

All the above responses enabled students to engage with the criteria at all levels of achievement.

It must be stated, however, that major and minor products don’t have to be linked in any way, and that successful achievement against the criteria is also possible at all levels using this assessment arrangement.

Product Records

The major and minor product records are used to provide evidence of modification and planning, production, and/or evaluation aspects of the realisation process. Evidence of completion and success against the criteria is almost wholly based on the submission of respective product records. It is of paramount importance that the product record be supplied to the moderation panel as part of the final submission and packaged according to the instructions in the subject operational guidelines. Other evidence, such as final images, web pages, interviews, and time-lapse videos, are also much valued in this process.

The moderation panel noted that the best examples of product records included evaluative commentary (meeting specific feature E2), supported by clear photographic evidence (Pr1, Pr2, and Pr3). The product records were not just a ‘journal’, but demonstrated thoughtful and logical progression to concepts and design brief intentions during the realisation process (E2 and Pl3). Evidence in Pr1 and Pr2 were clearly demonstrated by the use of appropriate photographic images. Pr3 can be demonstrated within the product record via statements from the students showing how they individually problem-solved during the realisation process. Where students had prior experience in evaluating against a set of criteria, they performed better.

Highly successful product records included excellent examples of computer games and ‘walk through’ videos to demonstrate thorough and insightful understanding of all design and realisation concepts.

An increasing number of students are providing product records in a variety of digital formats, including web pages, filmed interviews, AVI screen captures, and interactive Word documents. It is important though that these contemporary responses match the subject matter.

The moderation panel identified that highly successful student responses were almost entirely facilitated by inclusive, negotiated, and well-structured task design***.*** The programs of work that allowed students to identify areas of learning which motivated them were clearly the best, as they provided opportunities for students to achieve at all levels against the criteria. Nearly all of the A+ students thrived within such courses, enabling them to produce products of high standard, many well beyond the original task specifications. Examples included:

* communication products: for photography, students were encouraged to identify a theme and presentation mode individually, rather than be restricted to teacher-identified tasks. Many positive results were achieved, and evidence against the criteria was strong.
* systems and control products: for automotive, a course where students negotiated a series of repair and maintenance tasks within the course structure, allowing the student to demonstrate excellence against the criteria, rather than the teacher predetermining the teaching and learning.

This year saw the diversity of the subject continue. With nearly 4000 students, the depth and breadth of the subject offerings grew substantially. Examples included photography, CAD/CAM, furniture construction, metal technologies, film-making, sound technologies, textiles, food, radio-controlled submarine design and manufacture, electronics, robotics, web design, computer application design, and game making.

Successful student responses to the minor product were identical to the major product, described above. However, where the major and minor products were linked, achievement against the criteria was often high. It is worth reiterating that product records must support both major and minor products.

## External Assessment

Assessment Type 3: Folio

The folio assessment of this course provides students with an opportunity to demonstrate their engagement in the design process in order to realise a product. Students presented the required information in mostly well-structured paper or digital formats, with the most successful folios organised in a logical manner, often using the assessment criteria to separate each section, while still clearly linking all in a seamless manner to achieve their goal.

Students who engaged in this process most successfully were exposed to a course structure which gave them the freedom to demonstrate their own abilities and feel empowered in achieving outcomes unique to them. These students were genuinely engaged in the design process, successfully addressing all the performance standards. Students who pursued, or were directed, towards a service-type task or who were engaged in a kit-assembly activity found difficulty in addressing all aspects of the assessment design criteria.

The following discussion concerns how students provided evidence of their learning in relation to each of the specific features of the assessment design criteria applicable to this assessment type.

Investigating

*I1: Identification of a need, problem, or challenge*

A variety of methods, such as mind-mapping, identifying real clients, combined tasks, or clear personal interests, were used to identify a need or problem. Where students felt empowered in this process, with the ability to demonstrate initiative and creativity within the appropriate subject context, they had the opportunity to meet this specific feature at the highest level. Where a prescribed or common need or problem was provided, student opportunity to meet this specific feature was often restricted.

I2: Creation and validation of an initial design brief based on needs analysis and task identification

Students who were clear in the need or problem were more able to create a design brief with clear and concise requirements for the task. Where these outcomes were concise and clearly stated, students were able to successfully achieve high-level outcomes within the prescribed time. Clear statements of intent in the design brief frequently facilitated evaluating outcomes at a higher level. Design briefs which provide, or direct the student to, solutions to the proposed need inhibit the student’s ability to address some of the following specific features in an open and effective manner.

I3: Investigation and critical analysis of the characteristics of existing products, processes, systems, and/or production techniques

A variety of successful methods of presentation were employed by students, with the superior responses using concise, critical analysis of the examples considered. The better responses also considered a range of aspects of the requirements for the creation of a design solution to the identified need. The examples selected for investigation need to closely reflect the context in which the task is being undertaken; for example, an electronics course should have electronic circuits as its focus, with the mounting method as a secondary consideration. The interaction with ‘concrete’ examples often enabled students to provide an analysis of a higher level, rather than just providing website evidence. Successful investigations included the coverage or inclusion of all relevant data, including materials, processes, and systems to be used in the possible manufacture of the product. Examples include: a discussion of possible Photoshop techniques used for image manipulation, possible operations or software that might be used in media or film-making, CAD software options, CAM coding/roughing cut/finishing cut canned cycle options, tool path simulations, tooling, software for HTML generation, and possible coding for existing web page designs. The most successful student responses critiqued existing products using succinct terminology associated with the relevant discipline.

I4: Investigation of product material options and analysis for product use

This topic is addressed as part of Assessment Type 1, in the materials application task, with expected investigation into two material options. Consideration of a wider range of material options than those considered in Assessment Type 1 may also be given at this point, but at least a clear summary of the results of investigation in Assessment Type 1 and the link to the proposed design outcomes should be provided by the student.

I5: Investigation into the impact of products or systems on individuals, society, and/or the environment

High-level responses to this specific feature displayed a clear correlation with the subject context and product type, often with a seamless inclusion in the document. Superior documentation made use of a range of investigative resources, with clear links and reference to the sources provided in the bibliography. Students who focused their investigation on only one, or at the most two, impacts were able to evolve in-depth discussion within the required word-count.

Topics selected which had an obvious link to the product design enabled students to effectively reflect upon this issue again in the evaluation criteria. For example, when designing a magazine cover for a cookbook, the identified issue was the manipulation of women’s faces to make them wrinkle free; however, it could have been how food is photographed and manipulated to look more appetising or appealing. While both approaches are within acceptable contextual bounds, the latter example would indicate a more targeted and sophisticated identification of the issue of photo manipulation.

Planning

Pl1: Analysis of information to develop solutions to an identified design brief

The best responses displayed clear links with the design brief criteria and the information gained from the product investigation previously conducted. Using such information the student then went on to create a range of suitable solutions. From these alternatives, one solution was chosen for refinement and further development. Students who were using kits or commercial products which limited them to only one outcome were restricted in their ability to excel in this process. Additionally, students who were engaged in service-type activities found great difficulty addressing this specific feature.

Pl2: Communication of product design ideas, using relevant technical language

The markers were impressed by the variety of methods used to successfully communicate the solutions for the planned design brief, relevant to the chosen context. There was appropriate use of correct, sophisticated technical language suitable to the chosen design discipline. There was variety in the use of new communication technologies by students to express their ideas. The best responses initially showed a range of possible solutions which were then consolidated into one, with appropriate analysis, comments, and explanations provided to justify the final choice. Communication of these ideas was most effective when the method (such as sketches, CAD, digital images, circuit diagrams, or programs) was most relevant to the context. A better use of appropriate digital and electronic systems was evident this year; however, the chosen system needs to enable the student to demonstrate a level of manipulation, control, or operation to enable this specific feature to be met at the highest level.

Information provided in this section needs to be concise, with limited use made of repetitive data. For example, the use of photographic proof sheets is more suitable for the product record. However, evidence of planning is still required to meet the specific feature.

Pl3 Testing, modification, and validation of ideas or procedures

Students who responded best to this specific feature selected elements of their proposed design solution to test prior to using it in their final design. Some test examples of tests included joint types, photographic composition/manipulation, breadboarding, animation sampling, modelling, and cardboard mock-ups — the results of which were reflected in the final product. Some tests were also conducted using CAD engineering testing and computer electronic tests which gave meaningful results, thus providing confirmation of the design or allowing modifications to the outcomes. The results from the testing stage prompted many students to refine their design brief.

Evaluating

E1: Evaluation of product success against design brief requirements

Students who were most successful in addressing this specific feature related their comments directly to the requirements specified in the design brief created for addressing specific feature I2. The specific feature E1 was best addressed when concise and clear design requirements were stated, with realistic outcomes for the production time set.

E2: Evaluation of the effectiveness of the product or system realisation process

The best examples addressing this specific feature reflected upon the effectiveness of the product or system and its planned function. The best responses analysed the success, rather than described the processes involved or the personal experiences of the creator.

E3: Reflection on materials, ideas, or procedures, with recommendations

The more successful students reflected upon all three aspects of their product creation — materials, ideas, and procedures — using concise technical language. Where students provided visible evidence of full or part product completion, the comments were more realistic and provided confirmation of task outcomes. This specific feature was well addressed when students provided specific examples of modifications or alternatives demonstrating a high analytical ability.

E4: Analysis of the impact of the product or system on individuals, society, and/or the environment

This specific feature was not addressed well, or often not at all, by many students. The most successful student responses were able to clearly link (within a concise summary) the impact of their product, process, and outcomes to those reflected in the initial issue discussed to address specific feature I5,.

**General Comments on the Folios**

The better folios were structured in a logical and organised format, often using the specific features of assessment design criteria to separate each section. In this way students were able to link each stage of the assessment design criteria in a meaningful sequence with a seamless provision of information. Following this structure also assisted students to check that they had met all of the required specific features. Where there was evidence of strong scaffolding provided by the teacher, limited variation of outcome was too often evident, restricting a student’s ability to meet the performance standards to the highest level.

The provision of a word-count is a required part of the folio presentation, a requirement which many students did not meet. Students who did this well also provided progressive word-counts for each section. This word-count should be verified by the teacher.

Students who included evidence of the final product provided a more complete overview of the design process to the marker. The inclusion of the product record should not be given as a substitute for this evidence, nor should it be used instead of detailed planning. Evidence of producing was used in many folios in communication products where excessive information, such as proof prints, was provided as a substitute for the planning process.

The product complexity should be of rigour appropriate for a Stage 2 task and include a range of sophisticated skills which enable the student to meet the highest levels of Pr1, Pr2, and Pr3.

Despite clear instructions related to the external assessment, there are still a number of students who include evidence of the school, themselves, or the teacher. This problem should be detected at the draft stage and the student requested to edit out such details.

Using a range of media to present folios in their ‘best light’ is a sensible and inclusive strategy, and many students successfully presented their work to advantage. However it must be remembered that demonstrating achievement against the relevant assessment design criteria must be the focus of the student.

## Operational Advice

School assessment tasks (Assessment Type 1 & Assessment Type 2) are set and assessed by teachers. Teachers’ assessment decisions are reviewed by moderators. Teacher grades/marks should be evident on all student school assessment work.

Attaching product records to the folio (Assessment Type 3) as addendums is not recommended and in most cases adds unnecessarily to the word-count, meaning that important evaluative comments may not be read by markers.

Teachers should check materials carefully to assist students to de-identify themselves, their schools, and any other relevant data in Assessment Type 3. Such a check also provides verification that the student has completed the work. No such identification restrictions apply for other assessment types (school assessment).

## General Comments

This subject caters for a significant range of learning and assessment programs, and meets the needs of a significant number of students. Teachers are to be congratulated on their organisation and delivery of these courses, many of which are complex and demanding. Many teachers skilfully scaffolded, facilitated, and guided students through individual student tasks, requiring multiskilling and patience on their part throughout. It was also evident and pleasing that almost 80% of teachers’ grades were maintained, and that there was parity between the external and school assessed results.

However, to ensure that students are rewarded equitably and consistently for their work, the moderation panel has requested that schools are reminded about minimum requirements to be supplied for moderation:

* product records
* the current learning and assessment plan (LAP); LAPs need to be updated/renewed, and either rewritten or a Variations — Moderation Materials form submitted in the event of adjustments, as this document may be used to validate or further explain assessment details in the event of ambiguous task sheets etc.
* a marking scheme
* task sheets
* evidence of all tasks within each assessment type for each student identified within the sample (N.B. the nature of evidence can vary significantly from images to coding examples to recorded interviews)
* for any misplaced or lost work, the appropriate documentation must be supplied with the sample (the SACE coordinator in each school will have access to this documentation and it is available on the SACE website)

Clearly the more successful responses were typified by early identification of and planning for Assessment Type 2. This assists students to target their material applications task appropriately, and allows time for diligent and thoughtful design and preparation for the realisation process. The successful courses also provided for targeted specialised skills tasks that, where possible, prepared and enabled students to make informed decisions about coding types, joining systems, CAM solutions, camera techniques, imaging solutions, materials, or components. Both the moderation and marking panels reflected on the many successful student responses that were submitted as a result of the product being identified as early as possible in the course, and it then ‘driving’ the content and direction of other assessment type tasks.

The folio reflected a significant body of research and documentation surrounding the design process of the product.

It should be understood that Assessment Type 2 is a realisation task, while Assessment Type 3 is a record of the design process, and although the design process necessarily includes consideration for realisation, it is not appropriate for students to use product records in their folio, and then submit the same document in Assessment Type 2.

The moderation panel recommends that students who submit films for assessment should aim to limit the length of their response to a maximum of 5 minutes (which is in keeping with most major film competitions). By setting such a parameter, teachers would help students ‘focus’ on providing discrete evidence against the criteria within the time frame, rather than it be diluted or ‘lost’ in longer presentations. The ability to communicate succinctly in all contexts should always be encouraged.

It is important that assessment design criteria are deconstructed by teachers with their class at the beginning of each year.

Both the marking and moderation panels numbered nearly fifty members this year, and it was a common reflection from both groups regarding the quality training and development and general experience that they gained, while working with such a collegiate group of teachers. There were many new markers and moderators in both groups, which is a very pleasing sign.

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