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Design and Technology

2015 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.

Well-structured learning and assessment plans and task design closely mapped against the relevant performance standards resulted in exemplary student outcomes.

One of the most important statistical reports for this subject is the parity between the external and the moderated school-based assessment. External and moderated results were closely correlated in 2015. Such correlation indicates that teachers are effectively interpreting and applying the assessment design criteria.

The moderation panel believes that the standard of student responses has continued to improve, and many high-level, sophisticated responses were noted in all three assessment types.

## School Assessment

Assessment Type 1: Skills and Applications Tasks

Typically this assessment type featured two skills tasks, and one material or components applications task.

Task Design

Required assessment design criteria for Assessment Type 1 cover investigating, planning, producing, and evaluating. It should be noted that not all specific features within each assessment design criterion need to be covered in this assessment type.

Appropriate task design is a critical component of any Stage 2 learning and assessment plan (LAP). The moderation panel noted that best-practice tasks planned for and/or targeted student interest, and provided opportunities for all students to demonstrate success against the required specific features.

Successful tasks integrated student learning across Assessment Types 1 and 2. The teacher targeted a set of generic skills in Assessment Type 1 that were needed to prepare students for Assessment Type 2.

An example of such targeted task design included a student who identified an action figure as their nominated product for the course. The teacher and student then mapped out the skills and materials applications tasks that would best prepare the student to successfully complete the course. In this case, skills task 1 featured a CAD drawing of a lever arm to establish 3D-modelling techniques, orthogonal drawing practices, and rendering techniques, while skills task 2 was the investigation (formatively assessed) and subsequent drawing and 3D-prototyping of an articulated action-figure joint. Both of these tasks featured Pr1, Pr2, and Pr3 as the nominated specific features.

In addition, a mini-product record was required of the student, featuring Pl3 and E3 as the identified specific features. This was formatively assessed. Such formative practice resulted in very successful product records later in Assessment Type 2.

The material applications task in the above example targeted ABS and PLA plastics as possible alternative 3D-printer materials for manufacture.

Nominated specific features in the material applications task included:

*E3 Reflection on materials*

*Pl3 Testing, modification, and validation of ideas or procedures*

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

*I4 Investigation of product material options*

*I1 Clear identification of a need, or problem*

The above example was designed to provide the student with opportunities to provide evidence against carefully selected performance standards, thus not over-assessing.

Other successful skills tasks ranged from traditional joining exercises in timber and metal to CAD drawings, Flash exercises, animation sequences, and industrial design prototypes. The use of relatively new technologies such as 3D printers and laser cutters has provided opportunities for students to prototype designed models in a range of contexts.

It is important to design skills tasks carefully, so that the task provides opportunities for appropriate depth and rigour against assessment design criteria.

Material or component applications task

The intention of this task is to facilitate individual student identification and subsequent research and testing of materials or components that might be used in Assessment Type 2. The task should result in purposeful outcomes, and certainly assist informed student decision-making regarding material or component selection.

Thorough and purposeful testing was a feature of all successful tasks.

Good task design exposed all students to a range of possible material or component choices, and then facilitated student investigation and testing regimes across relevant materials or components.

The moderation panel noted that the most successful response typically was formatted in logical sequences and included a comprehensive bibliography.

An example of the layout of a logical response is below:

* Introduction: students explain what they are intending to design and realise, and therefore why their material selection is relevant.
* Description of materials: two materials, e.g. botanical/chemical classifications, common uses, and general characteristics.
* Hypothesis.
* Testing: describe the tests, explain the testing regime, and why the tests are relevant.
* Conduct the tests.
* Collect qualitative and quantitative results.
* Draw conclusions based on results of testing.

In addition, the panel noted the increased use of alternative media for the presentation of the task, e.g. voice-over screen captures. This worked effectively in contexts that were digitally rich, e.g. CAD, graphic design, photography, and IT. Video evidence of testing sequences would be a welcome addition to student responses, as would any form of presentation that enhances student achievement against the criteria.

The material or component applications task should be a maximum of 800 words. Several excellent student responses were within the word-count limit; however, the moderation panel noted that some students presented relevant and rigorous responses, but were well in excess of the word-limit. The task needs to be presented concisely, without compromising its purpose and intent.

The panel noted that in courses where there was clear evidence of teacher-student collaboration, results were enhanced.

Assessment Type 2: Product

The moderation panel was largely impressed by the standard of the realised products in this assessment type. Such products included movies, food and textile presentations, submarine working models, furniture, laser-decorated metal garden seats, computer-controlled robots, sophisticated websites, computer-based applications, computer games, CAD and CAM solutions, photographic images, and coding. The best products exemplified student ingenuity and enterprise.

Task Design

Good task design will target relevant specific features. In this assessment type, this includes the specific features Pr1, Pr2, and Pr3. In addition, students must address the performance standards of planning and evaluation, and Pl3 and E2 are the recommended relevant specific features. Teachers are free to select additional specific features, but run the risk of over-assessing. Students who were successful benefited from clear and concise task design.

Well-designed assessment tasks had their own identity, even though they may be part of a shared product. For example, a functioning client survey might represent the minor product and a website the major product, with both products having separate assessment schemes.

Careful reading and unpacking of the specific features used for assessment helped students understand and interpret the required standard. It was rare that student responses in depth and rigour varied between Assessment Type 1 and Assessment Type 2.

Product Records

Product records that displayed depth and rigour provided substantial evidence against the nominated specific features (often Pr1, Pr2, Pr3, Pl3, and E2) via written comments, images, sketches, and appropriate technical drawings used prudently. Students clearly and sequentially demonstrated the steps taken to realise their products, outlined relevant planning details, and evaluated their products.

Some teachers astutely prompted their students to present their product records using alternative media, for example, voice-over screen capture for digitally rich subjects like CAD, graphic design, photography, and IT-based products.

As part of their evaluation, some students conducted interviews, which were filmed.

The use of such alternative media allowed students to provided evidence easily. Importantly, however, students must be careful to target the nominated criteria, and ensure that these presentations do not become too generic in content.

In more practical environments, the panel observed some students providing a video of their completed products, e.g. a cabinet, where the student discussed the product and pointed out manufacturing qualities and outcomes, and discussed points around the producing performance standard.

Some students also provided a written response to augment the planning and evaluation specific features of the product.

Product records are required for both major and minor products.

Product records that were the most effective in terms of supporting the teacher’s grades also included clear evidence of completion of the student’s products. This evidence took many forms, but typically well-composed and clear photographic images were supplied, and often an image on the front cover of the product record proved to be a very helpful communication tool for the moderation panel.

Many students in digitally rich courses attempted to supply evidence of products like websites, computer applications, Flash animations, CNC simulations, CAD files and computer games, using the native/original software files, e.g. Unity, CATIA, and Inventor. Although the SACE Board has access to some software, there were issues around versions and computer compatibility which hampered and slowed down the moderation process.

Those schools that screen-captured student work, then presented it in MP4 or .AVI format (both of which can easily be read), were appreciated by the moderation panel.

All student responses should be presented in an appropriate electronic format that can be read at moderation. These formats are identified in the document *Submission of Electronic Files* on the website.

## External Assessment

Assessment Type 3: Folio

The folio assessment of this course is an opportunity for students to demonstrate their engagement in the design process in order to realise a product. Students who addressed the relevant specific features of this assessment at the highest level were genuinely engaged in the design process.

The majority of students used performance standards to separate each section, and each section was further subdivided using specific features while still clearly linking all in a seamless manner to achieve a coherent response.

The provision of templates or strong scaffolding tended to restrict student achievement within a class.

The specific features of the assessment design criteria that are assessed in the folio are discussed in more detail below.

Investigating

I1: Identification of a need, problem, or challenge

Students who achieved at a high level in this specific feature were able to provide clear outlines of a need or problem relevant to their interest. This had the effect of empowering such students and they developed a sense of ownership of the process.

Providing a clear need or problem better enabled students to create a design brief with clear and concise requirements for the task and to successfully achieve high-level outcomes within the prescribed time.

Where a prescribed or common need or problem was provided, it often prevented individuality of task and student ability, thus restricting student opportunity to meet the specific feature.

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

Clear statements of intent in the design brief frequently facilitated evaluating outcomes at a higher level. Design briefs which stated the product to be made, or intimated solutions to the proposed need inhibited 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

The better responses to this specific feature selected a range of examples which enabled analysis of several 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 and demonstrate something unique in each example. The interaction with ‘concrete’ examples rather than website images often enabled students to provide an analysis at a higher level. It is important that when images from websites are used to represent existing products, a complete reference to the source is provided.

The emphasis of the investigation should reflect the context; for example, a photography context should investigate and analyse photographic design, techniques, and formats as the focus, using terminology suitable to the discipline. Students who were most successful in addressing this specific feature provided meaningful analysis of the examples, concisely written, and with a clear identification of how the information obtained would influence their product design.

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

Students who successfully addressed this specific feature reflected upon the results of the materials application task of Assessment Type 1. They clearly identified the influence of this testing on their product design. Higher-level students expanded upon the materials tested in Assessment Type 1, choosing to study further materials which were relevant to the proposed design outcomes.

This investigation need not be exhaustive of all the material possibilities, but should be indicative of the depth of study to which the student is capable.

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

The high-level responses to this specific feature showed a clear and individual, student-created correlation with the subject context and product type. Students achieving at a high level made use of a range of investigative resources, created clear reference links to the sources provided in the bibliography, and used a high level of technical language. Such students displayed a technical understanding specific to the discipline. Successful students focused their investigation on only one, or at the most two, impacts to keep in-depth discussion within the word-limit. Topics selected which had an obvious link to the product design enabled students to effectively reflect upon this issue again in the evaluation specific feature E4.

A well-written and well-researched topic specifically linked to the product can address this specific feature in a concise manner without excessively affecting the word-count.

Planning

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

Students who were able to create clear links between the design brief criteria and the information gained from the product investigation were able to meet this specific feature to a high standard. They produced a range of clear, easily understood possible solutions. They then demonstrated their ability to refine and develop an idea.

If kits or commercial products are used as part of the product outcome, there must be ample opportunity in other contextual aspects of the product for students to demonstrate the ability to excel in this planning process. A LAP which does not encourage students to create their own design ideas, or is too prescriptive in the expected outcomes, inhibits a student’s opportunity to meet this specific feature to a high standard.

If a product design contains elements of both major product and minor product, these must be clearly identified, with the documentation in the folio focusing on the major product component.

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

The marking panel continue to be impressed by the variety of methods used to successfully communicate design solutions. Students who addressed this specific feature to a high standard used correct, sophisticated technical language, using a range of technologies. 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. These responses were detailed, with suitable, informative annotations.

Students who scored highly against this specific feature chose the most effective communication method relevant to the discipline. Sketches, CAD, digital images, circuit diagrams, programming, story-boarding, or other relevant methods were used to communicate ideas. 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 meet this specific feature at the highest level.

Information provided in this section should be concise, avoiding the use 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

When students selected appropriate elements of their proposed design solution to test prior to using it in their final design, they were able to effectively meet this specific feature.

The nature of testing varied, but included tests on joint types, photographic composition or manipulation, bread-boarding, animation sampling, modelling, CAD engineering testing, computer electronic tests, or cardboard mock-ups. The results of such testing were reflected in the final product.

Students who performed at the highest level showed evidence of meaningful results either confirming their design or suggesting that further modifications were required.

Where students used product record material, such as proof sheets or completed animations as their testing information, it was more difficult for them to meet the specific feature to a high standard.

Evaluating

E1: Evaluation of product success against design brief requirements

Students who prepared a concise and clear design brief requirement were most successful in addressing this specific feature, relating their comments directly to the requirements specified in I2. More successful responses were able to show a systematic or itemised account of how the design requirements were met through tables, checklists, or comments. Such validation was very successfully achieved using a video of the performance of the product.

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

Students achieving at higher levels were able to analytically link the effectiveness of the development of the product or system to its planned function. The best responses were analytical of the success of the product, rather than providing a descriptive account of the personal experience of the creator.

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

Students achieving in the higher bands analysed the materials used, and their ideas and procedures, using concise technical language relevant to the discipline. Where students provided visible evidence of full or part product completion, the analysis was more realistic and provided confirmation of task outcomes.

Students are encouraged to include some evidence of the completed or part-completed product.

A description (in contrast to analysis) of processes and procedures is more appropriate for a product record in Assessment Type 2.

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

The students who were most successful in addressing this specific feature were able to clearly link the impact of their product and/or outcomes to those reflected in the initial issue discussed in I5, with a concise summary. This was most evident where students had chosen an issue which related directly to their planned product and was carefully investigated and documented. A number of students chose not to address this specific feature and this affected their results.

General Comments for the Folio

* The better folios were structured in a logical and organised format, often using the specific features to separate each section. Following such a structure 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.
* When students are combining SACE and VET studies within the one context, it is often difficult to address all of the required SACE criteria either to a satisfactory standard or at all.
* Evidence of word-count is a requirement of SACE folio documentation. Some students used a progressive word-count for each section. There is no prescribed word-count for each specific feature, so teachers and students can select their own weighting to meet their needs. Word-count should be addressed in the drafting stage.
* Folios which showed evidence of effective editing achieved at higher levels. Teachers are encouraged to become involved in one draft of the folio, as it is a means of checking authenticity.
* Students who included evidence of the final product provided a more complete overview of the design process to the reader. The inclusion of the product record is of no use. It should not be submitted as a substitute or addendum for the folio.
* The product that the folio is based on requires rigour appropriate for a Stage 2 task. The product also needs to be achievable in the allotted time and include a range of sophisticated skills which enable meeting the performance standards at a high level.
* There should be no indication of school, student, or teacher provided in the folios. Any such evidence should be identified at the drafting stage and the student should be requested to remove these details.

## Operational Advice

School assessment tasks are set and marked by teachers. Moderators review teachers’ assessment decisions. Teacher grades/marks should be evident on all student school assessment work.

Packaging and presentation of materials

The moderation panel noted that most schools submitted all required materials, that is, a full set of assessment task sheets, the approved LAP with any addendum and notes included, all student work for both of the assessment types, the marking/grading scheme, and a performance standard rubric for each task.

Those schools who choose to submit work on an electronic storage device are encouraged to provide two copies on separate devices, to aid the efficiency of the moderation process, and in case of a device failure.

Submission of work in A3 format is not permitted.

All externally assessed materials should be de-identified.

## General Comments

The more successful students were well informed about the assessment requirements of the course, and had developed a thorough understanding of the relevant performance standards and associated specific features.

School grading of students was, in general, accurate and consistent.

The use of plagiarism-prevention software such as Turnitin in the drafting process can be a valuable indicator to the student.

Assessment Type 1

The materials or components task was marginally the weakest task, mainly due to the lack of appropriate testing.

Assessment Type 2

Product records caused issues at moderation. These are not ‘visual records’. The product record must address at least one specific feature of both planning and evaluation.

Assessment Type 3

Please note that digital submissions offer a range of enhanced opportunities for students to document their design processes, but they must be a maximum of 12 minutes in duration.

Successful approaches to these courses are steeped in the fundamental teaching methodologies around organisation, structure, and ownership. Teachers can access this important information via the SACE website, by attending clarifying forums, joining a marking or moderation panel, or by attending the Design and Technology Teachers Association (DATTA) workshops.

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