Design and Technology

2010 ASSESSMENT REPORT

Technology Learning Area

Government of South Australia

SACE Board of SA

DESIGN AND TECHNOLOGY

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GENERAL COMMENTS

This year student achievement improved from last year, indicating a continuing professional commitment to the subject area, and some innovative program-writing from teachers. Most teachers provided students with the opportunity to succeed with the product design folio. The more successful folios clearly followed the recommended designing model — investigating, devising, producing, and evaluating — and were well presented.

The moderation panel confirmed that generally teacher marking against the criteria was appropriate, and that student rank order was established accurately. Student outcomes were generally of an excellent standard, in terms of both the range of tasks and performance against the criteria. Students who were able to use the performance standards from the curriculum statement as a guide were clearly advantaged, as their responses were accurate and clearly satisfied the relevant criteria. Conversely, students who addressed the criteria in a less-focused manner often left out critical responses. This was particularly seen in Assessment Components 1 and 2, where clarifying questions or their equivalent could not be answered from the evidence presented to the student.

The most successful programs were those based on constructivist theory, where evidence of well thought-out scaffolding existed. Where basic principles were taught, and reinforced, before being attempted by the students in summative assessments, students' results were enhanced. In these programs, instruction appeared organised and sequential, and was reflected in the depth and standard of the student responses.

Overwhelmingly, the most consistent and successful results were demonstrated in Assessment Components 2 and 3, where the majority of successful practical outcomes were the result of quality teaching and student engagement. These components of a 2-unit program account for up to 90% of the marks, so it was important that teachers ensured that marking standards reflected the overall standard of a Stage 2 subject. To help with personal benchmarking, teachers are encouraged to discuss complex assessment issues with the SACE curriculum and moderation officer and colleagues.

The moderation panel believes that Assessment Components 2 and 3, while being very successful in terms of participation and completion, are usually generously marked against the relevant criteria for judging performance.

ASSESSMENT COMPONENT 1: CRITIQUING TASK

The maximum word-count of 700 (or equivalent) for these tasks was adhered to in general, although it was clear that some students chose not to complete both assignments within the task. The moderation panel believes that responses could be augmented by the efficient and prudent use of charts, tables, and annotated images. Tables may contain useful data that can be referred to in the body of the response, without compromising the word-count. An example is a table in a technological issues task that lists three types of viruses with data like common names, recent events, and part of system targeted to illustrate briefly how the virus functions. A product design task, where students critique an article of furniture, could include an image of the piece or enlarged, annotated images of sections, such as hinging, finishes or jointing. It must be noted that student-developed arguments will still

contribute to the word-count, so tables and charts should be used solely for data. Consult the SACE website for additional advice in this matter.

Product Design and Market Influences

Almost all responses were submitted in written form. The most successful responses occurred where the task was clearly:

- related to the context; for example, when designing or critiquing a ladder, a critique of joining systems or timber properties is more appropriate than of pressure-sensitive adhesives.

- part of a sequential teaching and learning program; for example, critiquing an existing multimedia presentation and then designing and constructing one is clearly a program of work that provides students with a pathway for the year, scaffolds their learning, and, therefore, encourages purposeful engagement.

The key criterion for judging performance in this task is that of analysing. To what extent is the student able to critique the purpose of the selected product, process, or system by considering its design concepts and production techniques? Successful student responses considered this section under the three indicators of purpose (students typically answered this part well), design concepts (strong evidence of consideration of design fundamentals and research was needed here), and production techniques (successful students could comment on the likely production method in some detail).

It was at times useful for students to consider another example of a similar product, process, or system, but this is not generally necessary, nor desirable. If, for example, students were required to critique the aerodynamics of a Formula One vehicle or the theme of a photographic exhibition, then two examples may be appropriate. Students critiquing more than one example often had difficulty achieving the necessary depth of analysis within the task's word-count constraints.

How well are the consumers' and/or manufacturers' needs discussed? Successful student responses included independent analysis of the consumers' and/or manufacturers' needs concerning the product, including labour costs, production, marketing, materials range, availability, obsolescence, and warranties.

Successful students used the advertising of their product when identifying and discussing market influences; for example, how product advertising could be used effectively within a website, or how the product of an injection die tool could be advertised and marketed. Students who were successful also included a review or conclusion with personal comment summarising their evaluation.

The more successful and sophisticated responses showed evidence of depth and thorough research. The effective and appropriate use of technological language and the general demonstration of strong technological literacy were common features of successful responses. Good communication requires detailed responses, and marks were awarded accordingly. The most successful responses were those that presented their work in a logical and sequential manner, often using contents pages to guide the reader.

Technological Issues

Students were generally able to successfully analyse a technological issue by identifying the intentions, basic design principles, and possible production techniques of the chosen issue. The most successful responses were as a result of studying an issue identified in the

product design task, and were typically a consequence of well-planned, scaffolded programs of work. Some responses were out of context; for example, reafforestation in a Communication Products subject. Many of the students enrolled in our subjects, particularly the Material Products focus area, are not easily motivated or engaged by Assessment Component 1, so thorough planning by the teacher is critical.

The evaluation criteria were successfully met when students provided a conclusion and summary statements that had clear links to their research. Again, the effective and appropriate use of technological language and the general demonstration of strong technological literacy were common features of successful responses.

ASSESSMENT COMPONENT 2: PRODUCT DESIGN AND REALISATION TASK

Design

The standard of design folios has steadily improved in recent years, and it was pleasing to see responses across all contexts. Teachers are reminded to allocate percentage weightings according to the level of rigour required at Stage 2.

There were fewer A3-type folders submitted in Communication Products (photography). Some of these folders may contain useful data, and can certainly provide evidence of the design process; however, their ability to meet the communication criteria is marginal. Few used contents pages or relevant means of navigation through the document, and obviously cannot be presented in digital form.

The most successful student responses included those that demonstrated an understanding of the design process, resulting in a very close alignment with the appropriate criteria for judging performance. Typically, these responses were written, but increasingly they are being completed in an interactive format, such as a web page or a word-processed file, which includes bookmarks and hyperlinks. This allowed the reader to browse the document efficiently, particularly between the investigation and devising sections. This form of presentation is equitable as student access to high-level output devices becomes irrelevant when tasks are marked from the computer screen. The inclusion of other interactive elements, such as animations and movie links, is to be encouraged, where appropriate, as they can provide definitive evidence of testing and devising.

Successful student responses had strong links between the investigation and devising sections. The less successful responses lacked depth in the investigation section and evaluative comment. Fewer connections between the investigation and the devised solution were evident. Teachers are encouraged to provide students with a comprehensive list of possible items for investigation, without stifling the depth of the response. This does not necessarily prevent students from expanding the list, but would provide a baseline and practical guide to the level of depth and engagement required at Stage 2.

Students are encouraged to use oral and video presentations to full effect where they can provide additional evidence of work completed. For example, an automotive systems and control program that requires investigation of an existing standing motor would be well suited to a video presentation that shows students testing parts and equipment, and providing anecdotal comments about the performance of the part. This would provide evidence of thorough investigation and is likely to suit the student far more than a written response in this instance.

A summary of the best design and communication responses includes tasks that had:

- a comprehensive design brief, which enabled the reader to clearly appreciate the task set for the student. The brief enables the teacher to check the student's understanding of the task. This is a vital stage of the subject and it is prudent for teachers to monitor student understanding and engagement in this task at this point where additional explanation and drafting can still be effective. The successful briefs clearly listed the constraints and demonstrated a clear correlation between the stated brief and the proposed outcome.

- a thorough and detailed investigation process covering a range of factors contributing to the success of the outcome. Typically, students demonstrated the ability to list alternatives, and were able to demonstrate some quite sophisticated levels of understanding and analysis. Importantly, there was evidence to suggest that these students had been exposed to a comprehensive teaching and learning program. Those students who had received formal instruction about the topics to be investigated were clearly advantaged. For example, students who investigated a range of knockdown fittings demonstrated understanding of the technology in the initial stages of the investigation process, as did a group of students investigating the use of frames within a website. Similarly, factors such as materials were extensively investigated following some instruction from the teacher. With regard to possible production methods, a few alternatives were mentioned, but these were completed in a comprehensive manner and often included flow charts or diagrams to explain the basic processes. Teaching students content prior to the design task provides them with accelerated opportunities to satisfy the criteria.

- evaluative comments (included either throughout the assignment or completed as a stand-alone feature) which were analytical and contained comment about the student's choice and selection process. Successful responses included comments related to the initial design intentions (from the design brief), an evaluation of the strengths and weaknesses of the outcome, and comment about what modifications might be necessary if attempting the task again.

- a devising section containing clear evidence of selection and justification of ideas, as well as a range of possible solutions. The solution also contained a reasonably detailed summary of how the designed outcome was to be produced. Typically, high-quality working rods, final drawings, and site maps were used as evidence of a completed solution in this section. In successful responses, every devised solution included reference to the investigation process. For example, all fonts used in a website were investigated, the jointing systems selected for a carcase were investigated, and all electronic components used in the final circuit could be found in the investigation section. These responses all demonstrated clear, strong, and logical links between investigation and devising. Successful responses were sequential in nature, and provided the reader with an understanding that all reasonable factors in the product realisation to follow had been dealt with comprehensively.

- clear, efficient, sequential and well-presented communication. The most successful responses included contents pages and/or navigation systems to efficiently guide the reader. Successful responses typically included evidence of technical literacy, including the effective use of technological terminology. These assignments were examples of planning, diligence and understanding, and this was reflected in the manner of presentation.

Teachers generally marked this section generously, particularly by rewarding students who were unable to investigate widely and who could not establish a sequential and logical trail from investigations to devising the final solution.

Realisation

Generally, teachers were diligent in preparation prior to the visit for this task moderation. Teachers provided appropriate levels of advocacy for their students, and students were provided with equitable opportunities to showcase their outcomes, although some were marginally generously marked. Almost without exception, successful responses were a result of many hours work by both teachers and students, and in many cases work was conducted outside normal classroom hours to complete the tasks. On occasion, however, some documentation was not complete at the time of the visit.

Most successful student responses show evidence of high-level skills, combined with safe and competent machine and tool use. The moderation panel have expressed their congratulations to both students and teachers for the level of engagement shown in many programs around the state.

Communication Products was the most popular focus area, particularly within a photography context. In general, these subjects were successfully run, and resulted in some very successful student work. Other focus areas involved modification and repair of motor vehicles production of trailers, clamping devices, or. multimedia presentations including web pages. Student products also included graphics, circuitry, and products using resistant materials such as furniture, and tool making.

The use of web pages is becoming increasingly popular; however, teachers need to be careful not to over-structure the subject. Several classes were noted providing basic templates for all student responses. This practice does scaffold to an extent, but it clearly diminishes the students' ability to investigate, devise, and produce individual responses. On the other hand, some excellent CAD/graphics responses were seen, and the panel would like to congratulate both teachers and students on their efforts.

It is difficult to be prescriptive given the range of contexts in this subject, but the most successful student outcomes were a result of:

- diligent and comprehensive planning. A significant amount of problem-solving and decision-making was completed during the investigation and devising sections of Assessment Component 2. The correlation between the two assignments was critical to the outcome. The moderation panel found that many students in the C and B bands had produced work which included well-developed skills, but the level of planning was often poor or did not match the practical skill levels.

- student skilling from work completed for Assessment Component 3, and a range of formative exercises.

- appropriate selection of materials, equipment, and processes or systems.

- appropriate teacher involvement or ownership of the outcome.

In most subjects the skills were displayed clearly; however, there were some instances where it was difficult for the moderation panel to make fair and consistent judgements. Those situations include automotive and some systems subjects where summative work is

often not obvious at the time of the visit. It is recommended that teachers digitally capture at least some of the processes.

Teachers are reminded to refer to the learning area manual for due dates, which is an equity issue and is highly important.

ASSESSMENT COMPONENT 3: SPECIALISED SKILLS TASK

As already noted, most teachers had their work ready for visitation, complete with full marking details. The rigour teachers had required in this task varied considerably across the state, and this resulted in some adjustments to scores during the visit moderation process.

It is within this task that many students showcase their skills and abilities. Often the responses are not driven by a student-based design task, but often a brief or drawing provided by a teacher. Completion rates for this assessment task were very high. Successful student responses included tasks aimed at skilling students for completion of Assessment Component 3, or to provide breadth within the teaching and learning program.

A wide and varied range of responses was noted in this task. There were many traditional programs running, but an increasing number in the Systems and Control Products focus area provided examples of new and emerging technologies. Robotics is an example, where students were required to build and program a robot to negotiate a set track. In one such case the outcomes were spectacular, and, interestingly, most students had studied within that context for the previous three years.

Marking in this task was consistent with the student ranking, but when marked against the criteria, it was often slightly inflated. The ability to work independently is one area where teachers' grades were inconsistent with the criteria for judging performance. A few also allowed some students to produce work that was not at Stage 2 standard. There is a discernible difference between students who require 'lock step' instruction and those who are more independent in their work habits and practices. Teachers need to inform themselves of the standard of practical work throughout the state.

Successful students:

- used the tools and equipment in a safe and efficient manner;
- selected processes and systems that demonstrated work practices allowing the equipment to produce reliable, accurate, and consistent outcomes;
- learnt and applied new techniques and skills quickly and effectively;
- worked to an excellent standard of completion, primarily without significant teacher direction;
- met the requirements of the design brief, as set by the teacher.

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