VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

2004 Systems and Technology GA 2: School-assessed Task

GENERAL COMMENTS

The 2004 Systems and Technology School-assessed Task (Outcome 2 of Units 3 and 4) required students to design, plan, produce, test and evaluate the operation and control of an integrated system or systems.

The School-assessed Task involved:

- developing a record of design, planning and production
- implementing the plan (production work)
- diagnostic testing and analysing results
- maintaining a journal to record progress and modifications during production
- evaluating the system and production activities (interim and final reports).

Teachers should refer to the *Systems and Technology Implementation Resource Kit 2001* and *Study Advice 2002* when planning the School-assessed Task. Other material is produced and revised through the Technology Education Association of Victoria (TEAV), and the Systems and Technology Victorian Certificate of Education Study Design also assists with the School-assessed Task. Teachers should also refer to the VCE Systems and Technology study page located at http://www.vcaa.vic.edu.au/vce/studies/systemtech/systechindex.html

Advice on management and organisation

Conditions which are conducive to high student achievement in the School-assessed Task include well-managed, organised classrooms/work areas and access to relevant technical resource materials. Teachers need to provide guidelines on the selection of appropriate tasks, timelines, due dates and the requirements of the task. Regular monitoring of progress is also important in supporting and encouraging students through their tasks. Students who plan and prepare good interim reports are generally better able to remain focused on their work for the duration of the task. Structuring the task through the above stages is a useful strategy, and timelines may be set to assist students.

The Additional Teacher Comment sheet should be used by teachers to document skills and competencies related to criteria 3, 4, 5 and 6 that may not be clearly demonstrated in the students' final presentation. This is available on the VCAA website at the address above.

Features of successful production work

A wide range of topics were explored in the School-assessed Task. Most students had negotiated production topics with their teacher. They organised work plans and work processes and set goals for completion and evaluation.

Successful student's work exhibited the following features:

- production tasks were completed using a diverse range of work processes that required a high degree of skill and knowledge
- design plans were thorough, detailed in depth and content and contained a range of design proposals or options; justifications were made for the selection of appropriate options and developed solutions
- diagnostic tests were planned with expected and actual outcomes identified, and a sound analysis of the test data was given
- evaluation reports were thorough and discussed the production activities as well as the practical outcomes of the task
- production activities involved working on an integrated system, its subsystems, parts and components; appropriate steps were taken to control the system and its inputs, processes and outputs
- completed systems were operational and produced to a very high standard of assembly and finish
- a high degree of effort and time had been put into achieving complete and operational status
- folios were of a high standard in content and detail, and a range of communication techniques were used to present information and design work.

Types of products

Examples of successful production activities selected for the School-assessed Task were:

- electromechanical toys and games
- hydraulic lifting, moving and locking devices
- controlled robot arms and vehicles
- engine powered scooters, go-karts and mini bikes

- controlled model houses, model hoists and bridges
- model watercraft and aircraft
- motor vehicle engine conversions, assembly and tests
- electromechanical alarm and warning devices for the home
- manufacturing and fitting car anti-theft devices and central locking systems
- wiring and setting of ignition and fuel systems on operating car engines
- controlled light and sound systems
- engine powered generators and motorised barbecue units
- musical instruments such as keyboards and electric guitars.

Areas of strength and weakness
Many production tasks were of a high standard, which reflected the emphasis on quality practical work. With few exceptions, the products were integrated systems characterised by the 'input–process–output and control' of integrated electrical/electronic and mechanical subsystems.

Teachers and students should note:

- most projects incorporated control of integrated systems. Successful student production activities involved work on integrated systems with processes such as manufacture, repair, modification and assembly of elements and subsystems within controlled operating systems
- students with high-scoring evaluations commented on and evaluated their production outcomes by comparing the production plan with the actual outcomes of the production work, including processes, modifications and difficulties encountered. Good folios often featured detailed interim evaluation reports
- technical data (obtained from the diagnostic test and other essential, relevant texts) should be used to prove how well the system is performing
- design and planning work should be thorough and reflect the requirements of the assessment criteria. Students should consider a range of possible ideas or options, select appropriate ones for further development and justify their decisions. Students who produced design and production plans with limited detail were disadvantaged as they had little documentation to refer to when assessing and evaluating their work and the related planning activities
- some tasks did not involve the 'control of a system' as required by this outcome and for the completion of this task. As advised in the 2004 Technology Assessment Guide, Unit 4 production work should involve working with an 'operational integrated and controlled system'
- the use of commercially produced kits or working with simple or basic projects can disadvantage students, as this limits the scope of planning and production activities; less complex kits are often suitable only as a subsystem of a larger integrated system
- some systems were not integrated. These were generally very simple to make and did not use a sufficient range of processes and skill levels to achieve high grades. These tasks did not fully satisfy the requirement for the product to be an 'integrated system' as they did not comprise of mechanical and electrical/electronic subsystems
- some projects incorporated the use of 240 volt DC power supply, which contravenes safety practices. A number of these products also displayed wiring faults such as bare connections or shortened earth wires. Teachers should refer to advice on electrical power supply and related safety issues published in the February 2003 VCAA Bulletin.

A number of schools used commercially produced workbooks and/or pro formas. Materials of this kind can seriously limit students' ability to develop a relevant and thorough folio that consists of detailed plans, tests and evaluations. For example, some only allow a few lines for students to justify options or complete an evaluation. Others only provide one page for each option and two or three pages for development work. Teachers are encouraged to develop their own project guidelines, which could be based on the task criteria, and use headings linked to each criterion and related sub-criterion points.

Some teachers allowed students or class groups to produce the same or similar projects. Many of these activities were too basic for this level of study (for example, servicing a lawn mower or assembling a basic alarm kit). When this approach was used, students' design and development work was often limited in scope due to the confinements of the set task. This was reflected in the assessment, and high grades were rarely achieved. Students should be encouraged to propose and develop individual products of their own choice.

Diagnostic testing
Teachers should note that testing can be performed at any relevant stage of production, with final testing to be done on completion of the system. Diagnostic testing directly relates to the production activity. It involves using test or measuring equipment to assess the performance of a system and its parts in terms of input–process–output and effective control.

The data obtained as a result of the diagnostic testing is used to gain a greater understanding of the system, to rectify problems, or to measure its planned performance against prescribed, recognised standards.

Tests were usually performed:

- at the beginning of the task, in order to determine faults
- during the production task, as a means of testing a sub-system
- at the end of the production activity, to determine the outcome and operational effectiveness of the system.

SPECIFIC INFORMATION

Criterion 1: Skill in developing a design plan for an integrated system
High-quality work involved the production of a thorough design and planning folio. Quality research responses documented the reason for the use of particular resources and the information gathered from those resources. High-scoring students considered ideas and research, using an exhaustive range of publications, user manuals, Internet sites, industry and recreational organisations to develop options that addressed the objectives outlined in their design brief. A justification of the selected solution was provided. Students used a range of methods to communicate their ideas and plans, including text, graphs, computer-aided design and illustrations. Criteria were established in the planning phase that would later be applied to the completed product to assist in judging the success of the production activities.

Criterion 2: Skill in preparing the production plan
Most students prepared a detailed production plan that included lists of equipment and components needed for the task. Successful plans outlined in detail the stages the student intended to use in their production work.

Criterion 3: Skill in the application of processes
Production activities that received ‘very high’ ratings exhibited a wide range of processes (usually five or more) that were of suitable diversity and complexity. Students who presented simple projects that contained limited production processes could not score highly.

Criterion 4: Skill in the use of tools, equipment and machines
Projects that demonstrated a high degree of proficiency scored highly in this criterion. The quality of soldering, drilling, machining, material preparation and assembly were areas where the competent use of tools, equipment and machines was demonstrated. High-scoring work exhibited components that were assembled to correct codes of practice or standards.

Criterion 5: Skill in realising the plan
The final project should demonstrate similarities to the actual project proposal, design plan and any recorded modifications. The system should be complete and operational as planned.

Criterion 6: Understanding of appropriate diagnostic test procedures
High-scoring work identified the purpose and described the test using appropriate terminology. Expected test outcomes were stated and supported by relevant technical data. Quality responses provided detailed and logical procedural steps for the test, as well as identifying tools and equipment used. Possible sources of errors and methods of reduction during the test were stated. Low-scoring responses often did not identify potential errors or alternative test methods.

Criterion 7: Analysis of data gained from diagnostic testing
Students were required to present the data collected from the diagnostic test in a clear, identifiable, technically correct form, using SI units where applicable. Most students presented the data using appropriate tables or charts and identified the source of the technical information. Very good responses presented an explanation of the actual result as compared to the expected result, and identified the effect of errors.

Criterion 8: Review of the effectiveness and efficiency of the design plan and production activities
The review required students to state the intended outcome and the actual outcome of the completed system and to make a reasonable analysis of these. The discussion should support judgments made about the production task, such as

the results from the planned diagnostic test and operation or performance of the final product. Students were also required to evaluate the sequence of operations of their production activities, comment on the nature of changes and identify safety concerns. Students who scored well displayed a sound knowledge of all the above aspects.