Systems and Technology GA 2: School-assessed Task

GENERAL COMMENTS

The 2002 Systems and Technology School-assessed Task (Units 3 and 4 Outcome 2) involved students in designing, planning, producing, testing and evaluating activities related to the operation and control of an integrated system or systems.

The School-assessed Task involves the following:

- developing a design and production plan
- implementing the plan (production work)
- diagnostic testing and analysing test data and results
- maintaining a log or journal to record progress during production
- evaluating the system and production activities (interim and final reports).

Advice on management and organisation

Conditions which are conducive to student achievement in the School-assessed Task include well-managed, organised classrooms/work areas and provision of 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. Planning and preparation of good interim reports assists students in remaining focused on their work throughout the duration of the task.

Teachers should document skills and competencies related to this criterion and Criteria 4, 5 and 6, that may not be clearly demonstrated in the students' final presentation on the Additional Teacher Comment sheet. This is available on the VCAA website at www.vcaa.vic.edu.au/VCE/STUDIES/tech/advice/stcrit.htm

Features of successful production work

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

Successful student work exhibited the following features:

- the production task was completed using a diverse range of work processes requiring a reasonable to a high degree of skill and knowledge
- the design plan was thorough and detailed in depth and content with a range of design proposals; justifications were made for selection of appropriate options and developed solutions
- the diagnostic test was well planned with expected and actual outcomes identified; analysis of the test data was made and explained
- evaluation reports were thorough and discussed the production activities as well as the practical outcomes of the task
- the production activities involved working on an integrated system, its subsystems, parts and components; attempts were made to control the system, its inputs, processes and outputs; the completed system was operational and produced to a very high standard
- folio work was of high standard in content and detail; a range of communication techniques was used to present information and design work.

Types of products

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

- making electromechanical toys and games
- building hydraulic hoists and locking devices
- making controlled robot arms and vehicles
- building engine powered scooters and mini bikes including control and monitoring devices
- making controlled model houses, model hoists and bridges
- constructing model water/air craft
- performing motor vehicle engine conversions and tests
- making alarm and warning devices
- manufacturing and fitting car engine tachometers, anti-theft devices and central locking systems
- wiring and setting of ignition and fuel systems on operating car engines
- making light and sound systems
- constructing engine powered generators and motorised barbecue spits
- making musical instruments such as 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 '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 the activities involving processes such as manufacture, repair, modification and assembly of elements and subsystems within controlled operating systems
- high level evaluation responses involved students commenting on and evaluating their production outcomes by comparing the production plan with the actual outcomes of the production work plans, processes, modifications and difficulties encountered; interim evaluation reports were strongly featured in good folios
- technical data (obtained from the diagnostic test and relevant texts) was often used to prove how well the system was performing
- 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 related planning activities
- some tasks did not involve the control of a system as required for this task; as advised in the Technology Assessment Guide Unit 4 production work should involve working with an 'operational integrated and controlled system'
- using commercially produced kits can disadvantage students as this limits the scope of planning and production activities; less complex kits are suitable only as a subsystem of a larger integrated system
- some systems were not integrated; these systems were generally very simple to make and did not use a sufficient range of processes and skill level to achieve high grades, i.e. they contained only mechanical elements and subsystems; these tasks did not fully satisfy the task criteria for the product to be an 'integrated system'; systems must comprise mechanical and electrical or electronic subsystems
- some projects incorporated the use of 240 volt DC power supply which contravenes current school 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 VCE Bulletin, February 2003 (pages 8 and 9).

A number of teachers organised students to produce the same or similar types of systems. Many of these activities were too basic for this level of study (e.g. servicing a lawn mower or assembling a basic alarm kit). When this approach is used, students' design and development work is often limited due to the confinements of the set task. Students should be encouraged to propose and develop products of their own choice.

Teachers should refer to the *VCAA 2000 Study Advice* and the *Technology Education Association of Victoria (TEAV) Support Material* for advice on suitable production tasks.

Diagnostic practice

Teachers should note that testing can be done at any relevant stage of production, with final testing 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 information obtained may be used to gain a greater understanding of the system, rectify problems or to measure its performance as planned and to 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 subsystem
- in most cases, at the end of the production activity to determine the outcome and the operation of the system.

SPECIFIC INFORMATION

Criterion 1 Skill in developing a design plan

High quality work involved the production of a thorough design and planning folio. Successful design work included consideration of a range of ideas with justifications made for selection of appropriate solutions. Students used a range of methods to communicate their ideas and plans including text, graphs, CAD, illustrations, CD-ROM, posters.

Criterion 2 Skill in preparing a production plan

Most students prepared a detailed plan for production that included lists of equipment and components needed for the task. Successful plans outlined in detail the stages intended to be used in production work.

Criterion 3 Skill in the application of processes

Production activities which received very high ratings exhibited a wide range of processes (usually five or more) and these were of suitable diversity and complexity. Students presenting simple projects containing limited production processes cannot rate highly.

Criterion 4 Skill in the use of tools, equipment and machines

Projects that demonstrated a high degree of proficiency gained high ratings for this criterion. The quality of soldering, drilling, machining, material preparation and assembly are examples where the competent use of tools, equipment and machines is demonstrated. More successful work exhibited components assembled to correct codes of practice or standards such as: resistor dressing, heat sinks located correctly, gaskets and seals neatly fitted, wiring looms clipped and located safely and retained securely.

Criterion 5 Skill in realising the plan

Projects 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

Highly rated work identified the purpose and description of the test using appropriate terminology. Expected test outcomes were stated and supported by relevant technical data. More successful 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. Less successful responses often did not identify potential errors or alternative test methods.

Criterion 7 Analysis of data gained from diagnostic testing

Students are 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. The source of the technical information was also identified. More successful responses presented an explanation of the actual result versus the expected result and identified the effect of errors.

Criterion 8 Evaluation of the effectiveness and efficiency of the design plan and production activities

The evaluation requires students to state the intended outcome and the actual outcome of the completed system and to make a reasonable analysis of these. 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. More successful work displayed a sound knowledge of all the above aspects.