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Moderators' Report/ Principal Moderator Feedback

Summer 2013

GCE Design & Technology (6RM01)
Paper 01 Portfolio of Creative Skills

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Introduction

Moderators report that this year they were in disagreement with fewer centre marks that in the past, but that some centres appear not to fully understand the requirements of this course, which is surprising as we are now five years into its life. Following is a summary of requirements.

Students are required to produce a Portfolio of Creative Skills which is divided into three distinct sections, Product Investigation, Product Design and Product Manufacture.

In Product Investigation, they must select a product that contains at least two materials and is manufactured using more than one process. They are required to investigate the selected product under the headings performance analysis, materials and components, manufacture, and quality. Students, under teacher guidance have complete choice in selecting appropriate products for investigation. Work can be presented in either A4 or A3 format.

In Product Design, students are required to submit at least one design task appropriate to AS levels of response that demonstrates their design competencies. They are encouraged to be as creative as possible and to support this there is no requirement for the designed product to be manufactured, which means there are no constraints placed on designs through the limitations of resources found in students. Students have the option in Product Manufacture of making what they design.

In the course of designing, students are expected to produce a range of initial design ideas accompanied by technical annotation, a review of design ideas based on product specification requirements and development of designs into a final design proposal that includes details that would allow a skilled third party to manufacture the intended product.

Students, under teacher guidance have complete choice in selecting appropriate design briefs. Work should be presented in A3 format.

In Product Manufacture students are required to plan, make and test one or more products that match the manufacturing criteria of the task. If a single product is made, it must be manufactured using more than one material and process and if more than one product is produced, the collective group must contain more than a single material and process. In this section of the portfolio, it is strongly recommended that teachers set the manufacturing tasks in order to ensure that students improve competencies and learn new skills in preparation for A2 tasks. It is a rule that where CAM is used, it must not exceed 50% of product manufacture.

Where more than one product is made, planning and testing should only be evidenced once.

It is a requirement that clear photographic evidence is submitted that shows the quality and complexity of challenge relating to all manufacturing tasks.

Work in this section should be presented in A3 format.

It is expected that the complete Portfolio of Creative Skills will be presented using 25 – 30 sheets of A3 paper. There is no penalty for exceeding these guidelines.

Criterion A - Performance analysis

Students who carefully and concisely structured their responses under appropriate sub-headings such as form, function, user/performance requirements etc. found it easy to access higher marks, especially when they approached their assignment from the point of view of a designer setting out to write a specification for a product in preparation for manufacture rather than analysing an existing product. Some students failed to structure their responses well and rambled through this section, wasting time and effort for little reward.

Despite repeated advice offered through reports such as this and moderator feedback to centres, selection of a 'similar product' remains an issue where some centres still allow students to select products that are so similar 'compare and contrast' is almost impossible to deliver.

Where centres allowed all students to work on the same two products, this led to duplication of information and defeated the purpose of students in a cohort collectively investigating a broad range of products to develop knowledge and understanding and offering teaching opportunities relating to Unit 2 content. The best work in this section always comes from students who work individually on their own products, but where this is difficult to organise or achieve, two products could be utilised for common use; one being used as the primary product for half the group while the other half use the second product, before swapping over for the 'similar product'.

Some students simply wrote a second specification for the similar product and failed to compare and contrast the two, while a few did not submit any photographic evidence of the products under investigation, which made it difficult for moderators to appreciate what was being discussed.

Criterion B – Materials and components

In this section, a significant number of students continued to investigate both the 'primary' and 'similar' products, when only the primary product, the one chosen originally, should have been considered in this and the following Product Investigation criteria. The 'similar product' is only considered in assessment section 'A'.

The requirements in this section are that students will identify two materials used in the manufacture of the product under investigation and suggest one appropriate alternative for each.

Almost all students were able to identify two materials used during manufacture, listing their advantages and disadvantages, although disadvantages were not well discussed. Unfortunately, the majority of information offered was generic to the identified materials and did not focus on the design needs of the product being investigated. It is disappointing that despite repeated references made during feedback to centres, students remain determined to list all they know about the identified materials, with little selectivity or regard for design needs.

Most students were able to suggest alternative materials that were appropriate for use in the product, but many were narrow in their choices, particularly where plastics were involved. Selecting ABS as an alternative to HDPE, gives little opportunity to discuss different advantages/disadvantages or to identify different properties, as they are almost identical materials. The point of this criterion is to broaden students' knowledge and understanding of a range of materials and to assist teachers in teaching Unit 2 content. With this in mind, it was hoped that suggestions for alternative materials would be wider and more considered than is being seen currently.

An increased number of students were able to address 'environmental impact' very effectively, considering extraction; processing; refining; transportation and reuse and recycle. However, large numbers continued to focus on sustainability rather than environmental impact.

Criterion C – Manufacture

In this section, students are required to identify two processes used in the manufacture of the product under investigation and to suggest one appropriate alternative for one of the identified processes.

Almost all students were able to identify two appropriate manufacturing processes used in their product. They gave advantages and disadvantages of the identified processes, but as in the previous section, commonly failed to link these to the design needs of the product. Most students were able to suggest an alternative manufacturing process, but where plastic moulding was involved, this was a problem and common suggestions for alternatives to injection moulding were vacuum forming, blow moulding and sometimes rotational or compression moulding, which in most cases were inappropriate.
It is recognised that processes such as those previously mentioned have few if any appropriate alternatives, so it is quite acceptable for students to consider alternative processes that could be used if a different material was used. An example of an alternative to injection moulding HDPE might be pressure die casting of aluminium alloy if this material was used instead.

The environmental impact of using the processes identified was not well done. As with the previous assessment section much of the evidence seen was generic and failed to focus on the effects of using the identified manufacturing processes.

Criterion D – Quality

Quality Control was well addressed by many students but in many other cases this was often generic and not directed at the product under investigation. The issue of standards relating to the manufacture of the product was rarely addressed effectively and many students did not know how to deal with this if there was no evidence of a specific standard on the product. Regulations such as the ISO 9000, ISO 14000 series and the 1974 Health and Safety at Work etc. Act can all be used as appropriate standards, provided that a student can explain how they would affect manufacture of the product under investigation. Many students attempted to explain 'Quality Assurance', usually in general terms, when what is required is a quality assurance system relating to the product under investigation which could be presented in the form of a flow chart using

sub headings such as Preparation; Processing; Assembly; Finishing and After-sales.

Criterion E - Design and development

At last, moderators reported an improvement in work seen in this assessment section, whereas in previous years this could not be claimed. Only a very few students carried their design challenge through to the making task which meant that the majority could really try to explore their creativity with more open minds and were not constrained by limitations of materials and processes available within centres.

This year many more students adopted a 'blue sky' approach which led to some very innovative work. However, whilst blue sky gives students the opportunity to demonstrate their creativity, this must be tempered by the need for realism in specifying materials and processes when annotating how a design proposal might be manufactured. Students are not required to understand how technological concepts work and should treat these as 'black-box' issues, but they are expected to understand and communicate all other information necessary to manufacture the product containing the black-box technology. It is not acceptable, as specified by one student, to say that the materials and processes to manufacture his blue-sky design had not yet been discovered or invented, so he was unable to specify them.

A wide range of design work was seen, some of which was outstanding, demonstrating flair, knowledge and understanding of how materials and processes should be used and showing true ownership if design proposals through exploration of design sub-systems. At the other end of the scale, some designing was cursory, undetailed and no more than a series of body-styling exercises that lacked any technical detail. Some centres allowed students to work on six or eight initial ideas, which is too many as details are either repetitive or not well considered, whereas fewer ideas allow students to spend more time in exploring design details and technical aspects in depth.

There were a lot of instances where design work was interesting and creative, but lacked technical details of materials and processes that could have been used were designs taken through to manufacture and reference to design criteria to check progress and viability of designs was weak in many cases, often because no criteria were set.

At the beginning of this section a design brief containing measurable design criteria should be developed and this should be used to evaluate designs as they progress. Without these criteria a proper evaluation of the final design proposal cannot not be carried out.

All students presented a range of design ideas, but many failed to explore these in detail. Annotating a sketch to say that one part moved relative to another, or by pressing a lever, a mechanical detail moved, turned or slid is not acceptable without a graphical explanation to show how this would be achieved. Marks are gained for details of sub-systems of design ideas to show how mechanisms work, drawers slide, parts rotate and so on.

Apart from a minority of students producing excellent work, idea development was not well done by the majority, who still appear to struggle to understand what is required. The majority of students simply took one of their initial ideas and detailed it with technical and construction information, which is part of development, but true development involves further design input to refine and form a final design proposal that might include details taken from more than one initial idea. There should be perceivable differences beyond the simplistic and cosmetic, between an original idea and the final design proposal. Some students developed more than one idea where a single development is required and a few presented completely different final designs that bore no relation to any initial idea.

All students used modelling as part of design development, but many did not justify their reasons for doing so. Modelling should be used to test design features in order to elicit information to improve or justify design decisions and should not be included because it is listed as part of an assessment statement. Modelling can be carried out using resistant materials, or 3D CAD; the vast majority of students demonstrated high levels of expertise in using CAD packages and whilst this was impressive to see it was rare to find them drawing any decisions or progression out of this work. There remains a minority of students for whom the quality of modelling was so poor, there was no way in which it could inform or enhance the design process at all.

Development should produce a clear and detailed final design proposal that includes technical details of materials, processes, techniques, fixtures and fittings that will be used during product manufacture. There should be enough information present to enable a skilled third party to manufacture the product. The final developed design proposal should be evaluated objectively against the design criteria to justify the design decisions taken.

As a result of development, most students were able to produce a final design proposal that included some technical details of materials, processes, techniques, fixtures and fittings that would be used during product manufacture, but not many objectively evaluated the proposal against the design criteria, often because no criteria were set as part of the design task.

Criterion F – Communicate

There was a definite improvement this year in the level of graphical skill and ability seen, especially in freehand sketching. Very few students used 3D CAD at the initial design stage, which was encouraging to see; 3D CAD was used extensively and appropriately in design development and as mentioned previously skill levels in this regard were high. Where orthographic working drawings were produced, these were very often generated automatically from 3D CAD sketches, which is acceptable. However, a problem in using this technique is that dimensions are often recorded to two or three decimal places, which makes them unrealistic, resulting in a third party being unable to make the product from the drawings provided. It is expected that when this short-cut to a working drawing is used, students will edit and modify dimensions to make them realistic.

Criterion G – Production plan
Most students are now able to write production plans well, which include appropriate levels of detail when sequencing making activities and realistic timings for tasks and deadlines. A minority of planning was retrospective, but significantly more included units of time given in lessons, days or dates, without further qualification to say how long these periods were in real-time.

Although not a current requirement through an editorial oversight, most students included quality checks in their planning, but where QC checks were included, the vast majority were statements such as “does it fit” or “are the corners square”, which are questions and not described checks. Many students included health and safety, a feature not necessary in planning, but a requirement of ‘making’ which can be evidenced here.

Criterion H – Making
As was the case last year, in this section students were well assessed by centres and some very high quality work was seen. However some centres are recognisable from the tasks they set as they are the same year on year, which is disappointing and goes against the ethos of a design and make course where change and improvement ought to be in the forefront of task setting.

A significant number of tasks set by centres lacked challenge and complexity and it was difficult to see how new and challenging skills were being introduced and developed in preparation for A2 work. Simplistic and unchallenging tasks not only limit potential for students to score high marks, but are surely dull and uninspiring for students, particularly those of higher potential.

It is an option in this section that all students are allowed to make the same product, but it is true to say that the best work comes from centres where there is some choice of product, or some making decisions are made by students.

A very small minority of students presented work that used a single material and were penalised because the requirement is that there must be two different materials used in making a product.

fewer students failed to justify the choice of materials used in their making tasks this year, but this is still a problem for some and limits potential for scoring maximum ‘making marks’.

Criterion I – Testing
Testing was generally poorly carried out, being largely subjective with little evidence of realistic and useful tests set against measurable manufacturing criteria, usually because none were set. Whatever the making task, it is important that some measurable criteria are determined at the outset, so that testing against performance and quality of the finished product can be carried out.

Third party testing often consisted of superficial, congratulatory comments, sometimes written by the student, which did not focus on specification points.

Grade Boundaries

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