EXAMINATIONS COUNCIL OF ESWATINI

EGCSE

EXAMINATION REPORT

FOR

DESIGN AND TECHNOLOGY (6902)

YEAR

2022

Table of Contents

EGCSE DESIGN AND TECHNOLOGY

Paper 6902/01

Design Core

Introduction

The Design and Technology syllabus consists of four components, namely: Paper 1 (Design Core), Paper
2 (Graphic Products) which is an option, Paper 3 (Resistant Materials) which is an option and Paper 4 (Coursework).

Number of centres and candidates from 2018 to 2022: The table below represents statistics of number of centres and candidates that have sat for the Design and Technology external examination for the past five years.

Year	2018	2019	2020	2021	2022
Centres	103	100	103	103	97
Candidates	862	814	858	1340	740

Comment on number of centres: The statistical data presented in the table above indicates that the number of centres offering Design and Technology decreased by five (5) between 2018 and 2022. There has been a steady increase in the number of centres offering the Design strand of the school curriculum between 2018 to 2021. Although there was a sharp decline by five centres between 2021 and 2022, even though there was a new girl's centre offering the subject for the first time in 2022.

Comments on number of candidates: Even though the figures in the table above indicates that the number of candidates sitting for Design and Technology was increasing by the past years, in 2022 we have seen a sharp fall that was never experienced in the past 10 years and the 740 was far below the expectations. Statistically the number of candidates that had registered for the Paper subject in 2022 was 740. However, the number of candidates that sat for the exam plunged to 721. Attendance registers revealed that some candidates who registered were absent during the examination period.

In 2022 there were 10 centres which registered only 1 candidate, which was a downfall compared to the previous year. Some 71 centres had registered between 1 and 10 candidates collectively, compared to the 34 centres in 2021.; whilst a total of 23 centres registered a range of 11 to 20 candidates, a decrease of 23 from the previous year. There were 4 centres who registered a range of 21 to 30 compared to 2021.The highest number of candidates were 24, 26 and 29 registered in three centres.

As noted in previous reports, there are areas in the syllabus that need improvements. Such areas are: dimensioning, rendering techniques, line quality, proportions, detailed construction, graphic communication, graphical materials, working in card, card joints, lettering style, evaluation of ideas, types and usage of mechanisms including mechanical movements.

Key messages

- Full solutions to the design problem in response to part (e), should include constructional details rather than manufacturing methods that might be used in the workshop or design studio.
- Candidates should remember that simple drawings are often better than words when describing manufacturing methods that are suggesting response to part **(g)**.

General Comments:

Candidates responded as intended to all three optional questions and there was an increase in the number of candidates opting for **Questions 2**, but a decline in those opting for **Question 3** than in previous years. **Question 1** was, by far, the most popular choice question for candidates. Statistically seven hundred and twenty-one (721) candidates wrote this Paper. Of these candidates five hundred and eighty-four (584) opted for **Question 1**, whilst one hundred and twelve (112) chose Question 2 and twenty-five (25) answered **Question 3**.

Quite a number of candidates responded very well to the design question of their choice and very few showed that they could not engage competently in the design problems set in the context of kitchen unit for waste products, free standing promotional displays and an empty can crush devices. Candidates were to show a high level of originality in their design work.

The A3 answer sheets are intended to help candidates follow the required design process and those candidates who responded as required were able to effectively demonstrate their design and thinking skills.

Comments on Specific Questions

Question 1

This was the most popular question compared to the other two and the majority of candidates understood the requirements of the unit that fit in a kitchen space that will store four types of waste products of different materials separately.

(a) Very few candidates were able to list correctly four additional functions of such a unit. However, there were responses that had nothing to do with the functions of the bin such as the aesthetics side of the product whilst some were not justifying their responses which led them to lose marks.

Very few candidates repeated the given function points instead of adding four additional points as the question required. Successful responses included; separate different items, easy to access items, have lid to stop smell, easy to remove/empty, label materials, stable in use, easy to clean, hygienic, safe to use, do not take too much space on the table, match the kitchen environment etc.

(b) Most candidates were able to sketch two different places where the unit could be positioned in a kitchen. Very few candidates misread the question and sketched joints for the unit instead of places in a kitchen; which resulted to a loss of valuable marks. However, those candidates who scored good marks were able to sketch two of the places where the unit can be placed such as; under worktop, in a corner, in a cupboard/drawer, hanging on wall, on a door, with good annotations.

(c) The majority of candidates presented three ideas and they were fairly creative in their response to the design problem. Very few came out with less than the three required concepts which were marked on pro-rata basis. However, most of the candidates lost marks for failing to properly represent their ideas with colour or enhance their ideas.

Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to provide information on the nature and detail of each design idea, including some dimensions to show the sizes and the suitability of their ideas meeting the design brief and four out of eight of the specifications listed in (a).

(d) The majority of candidates were able to give precise advantages and the disadvantages of all three ideas and they were able to discriminate between all three of their design ideas in relation to the context of the question. Candidates who repeated evaluations on the different ideas lost some marks. Only one centre used the matrix method to evaluate their ideas, centres are advised to encourage their candidates to use the provided spaces for these evaluations. The most capable candidates included comments which showed valid judgements rather than just simple descriptions of each design idea.

The majority of candidates were able to select their preferred idea and gave a clear justification for their choices. Very few candidates used the justification which say they chose a particular idea because it meets all specifications, which led to a loss of a valuable mark. Those who got the mark gave reasons such as it is easy to manufacture the idea in a school workshop, cheaper to make, uses fewer materials or repeating some of the advantages stated on the evaluations,

(e) Candidates were at liberty to use any drawing method to produce a full solution to the given problem as long as they provided the required constructional details and dimensions.

Very few candidates were able to produce high standard of drawings with wide range of enhancing techniques some did not add the constructional details in the form of sketches or in written annotations, some only showed the three overall dimensions only with no detail dimensions, in that way they lost valuable marks.

Successful candidates drew high standard pictorial drawing which was large enough and clearly drawn, showing all constructional details with all overall and additional dimensions.

(f) Many candidates selected specific materials appropriate to the design presented in the prevous section, although some were just naming irrelevant materials to their designs. Very few candidates gave generic responses such as wood/metal/plastic, such responses were not awarded marks. Reasons given for choice indicated that candidates had considered the structure of their design and were familiar with the strengths and weaknesses of a range of specific materials in that context.

(g) Quite a number of candidates were able to give a detailed description of manufacturing one part including appropriate method. However, there were those that gave scanty description of the processes through annotated sketches.

Responses to this part needed to include details beyond general marking out and preparation methods done to any product part. Other details such as shaping, cutting of joints to the selected part till it is ready to be assembled to the other parts was also very much needed, also showing the tools used. The use of simple drawings in addition to written text was generally successful.

Question 2

Design a freestanding promotional display to be placed at the entrance of a hardware to promote new kitchen bins.

This question was attempted by 112 out of 721 candidates. It was intended for those who are following the Graphic Products option. Candidates appeared familiar with the requirements of a promotional display to be placed at the shop entrance.

(a) Quite a number of candidates were able to list two of the four functional points of the freestanding promotional display of the new kitchen bins to be placed at the entrance of the hardware. Successful responses included attract attention, compact, colourful, bright

appearance, interesting, exciting, reflect the products, gives information, stable in use, safe in use, water/weather resistant, show prices, can be folded for easy storage, easy to read, easily assembled etc.

(b) Most candidates were able to show two ways to strengthen a cardboard. There were few candidates who were showing laminating method in two different ways.
Successful candidates drew cardboard folded, corrugated, lamination, tubular, gussets, etc.
There were variations though in the quality of sketches with some candidates, producing sketches with little or no annotations and proper representation of the idea as required by the question.

(c) The majority of candidates presented three ideas and they were fairly creative in their response to the design problem. Very few came out with less than the three required concepts which were marked on pro-rata basis. However, most of the candidates lost marks for failing to properly represent their ideas with colour or enhance their ideas.

Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to provide information on the nature and detail of each design idea, including some dimensions to show the sizes and the suitability of their ideas meeting the design brief and four out of eight of the specifications listed in (a).

(d) The majority of candidates were able to give precise advantages and the disadvantages of all three ideas and they were able to discriminate between all three of their design ideas in relation to the context of the question. Candidates who repeated evaluations on the different ideas lost some marks. In 2022 there was only one centre which used the matrix method to evaluate their ideas, centres are advised to encourage their candidates to use the given space for these evaluations. The most capable candidates included comments which showed valid judgements rather than just simple descriptions of each design idea.

The majority of candidates were able to select their preferred idea and gave a clear justification for their choice. Very few candidates used the justification which say they chose a particular idea because it meets all specifications, which led to a loss of a valuable mark. Those who got the mark gave reasons such as it is easy to manufacture the idea in a school workshop, cheaper to make, uses fewer materials or repeating some of the advantages stated on the evaluations.

(e) Candidates were at liberty to use any drawing method to produce a full solution to the given problem if they provided the required constructional details and dimensions.

Very few candidates were able to produce high standard of drawings with wide range of enhancing techniques some did not add the constructional details in the form of sketched or in written annotations, some only showed the three overall dimensions only with no detail dimensions, in that way they lost valuable marks.

Successful candidates drew high standard pictorial drawing which was large enough and clearly drawn, showing all constructional details with all overall and additional dimensions.

(f) Many candidates selected specific materials appropriate to the design presented in the previous section, although some were just naming irrelevant materials to their designs. Very few candidates gave generic responses such as wood/metal/plastic, such responses were not awarded marks. Reasons given for choice indicated that candidates had considered the structure of their design and were familiar with the strengths and weaknesses of a range of specific materials in that context.

(g) Quite a number of candidates were able to give a detailed description of manufacturing one part including appropriate method. However, there were those that gave scanty description of the processes through annotated sketches.

Responses to this part needed to include details beyond general marking out and preparation methods done to any product part. Other details such as shaping, cutting of joint to the selected part till it is ready to be assembled to the other parts was also very much needed, also showing the tools used. The use of simple drawings in addition to written text was generally successful.

Question 3

Design a can's crushing devise that would be used at home to crush empty cans to take less space for recycling.

Only 25 out of 721 candidates answered this question. In this, question candidates were required to design an empty soft drink can's crashing device that will be used at home so that they take less space for recycling. The requirement for the device was such that candidates could make the use of their knowledge and experience of systems and control and the use of mechanisms in interesting context.

(a) Very few candidates were able to list four additional functions of such a unit correctly. Some candidates were not justifying their responses which led to a loss of valuable marks. Successful responses included; simple to operate, adjustable to different height and to take different can sizes, little force required, have safety locks, securely, stable in use, simple to operate, hygienic, safe to use, water/corrosion resistance, stable in use, safe to use, etc.

(b) Quite a number of candidates were able to sketch two different mechanisms that could be used to operate the fruit picking device. Successful responses included linkages, screws, camps, hydraulics/pneumatics and followers, rake and pinion although some lacked proper representation of the idea. Others lacked proportions while others had no annotations.

(c) The majority of candidates presented three ideas and they were fairly creative in their response to the design problem. Very few came out with less than the three required concepts which were marked on pro-rata basis. However, most of the candidates lost marks for failing to properly represent their ideas with colour or to enhance their ideas.

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EGCSE DESIGN AND TECHNOLOGY

Paper 6902/02

Graphic Products

Key messages

- The focus of this assessment is Graphic Products. Impending candidates would benefit from the practical activities based on the questions contained in this paper.

General Comments

In this component, candidates were required to answer all three questions in Section A (A1, A2, and A3) and then proceed to answer either **B4** or **B5** from Section B. Very few candidates did not attempt any question in Section B. Such candidates lost valuable marks allocated to this part of the question. By far, **Question B5**, was the most popular optional choice question in Section B for most candidates.

As noted in previous reports, there are areas in the syllabus that teachers need to pay special attention to such areas are proper application of geometric construction, drawing of centre lines, projection lines, and use of the thick and thin lines, correct orientation of drawings in pictorial drawings and the correct method of projection views in orthographic projection.

Comments on Specific Questions

Section A

Question A1 compulsory question

Barrier gate with a STOP sign.

Candidates were required to complete the full size of the stop sign started on the answer sheet to include;

(a) Adding letters; **S, O** and **P**.

(b) Constructing the regular eight sided polygon given base and one angle.

(c) Naming the polygon.

The majority of candidates could not print the letters similar to the given style and size (thickness) they lost good marks for that, they only managed to get a mark for making their letters the same height as the given 'T'. Examination Centres are advised to work on this letter printing skill.

When coming to the construction of the octagon most candidates just used their 45° setsquares to draw the polygon instead of using the compass to construct it and that led them to lose some marks. Lastly majority of candidates managed to give an octagon as the correct name of the polygon.

Question A2

Second compulsory question.

Guard house to be drawn in one-point perspective given the starting point and the vanishing point.

All the candidates were able to interpret the given orthographic views of the guard house. Majority of them managed to draw the house in one-point perspective as required and they got good marks. Some failed to correctly orient the house as required, others were not using the given vanishing point. Quite a number of candidates did not the house to the correct height of 70 mm and the window or door were also not drawn using correct measurements, that led them to lose some marks.

The examiner was expecting candidates to draw the correct front and end views, draw the door and the window using the given measurements, have an 80 mm length of and the 70 mm height. Lastly have all the necessary radial lines meeting at the given vanishing point.

Question A3

Last compulsory question.

Car model

Candidates were required to complete the drawing of the car model started for them use geometrical construction of the elliptical shape and the curved ends.

Quite a number of candidates were able to draw the R 70 mm and R 78 mm car ends, and the R 30 mm wheel also the elliptical roof. Although some could not construct the elliptical shape of the roof, they just used French curves to draw it which led them to lose valuable marks. The examiner was expecting candidates to use concentric circle method or rectangular method to construct the elliptical roof, a trammel method was also acceptable as long as the used trammel was attached to the question.

Section B - two optional questions

Question B4

Suggestion box.

This question was from an actual 'Graphic Product' as the suggestion box was made from card. It was the most popular question to the candidates as 294 out of 313 of them attempted this question.

(a) (i) Candidates were required to draw full size, a development (net) of the suggestion box.

Most candidates managed to draw the 3 panels of the net of the suggestion box but failed to come up with the 134 mm overall width and the overall length of 172 mm. some lost marks when drawing the two rectangular slots of 20 mm x 10 mm as they could not position them, while others failed to correctly represent the folding line between the big flaps, glue tabs and 3 panels instead of broken lines they used solid lines.

Those who got all the full marks drew the 3 main panels of the net, they also drew the 4 big flaps accurately as per the given measurements, represented the all 8 folding lines with broken lines, had the 134 mm overall width and 172 mm length of the net. They also drew the two rectangular slots as required, correctly positioned and had the two accurate glue tabs chamfered at 45°.

(ii) Candidates were required to draw an appropriate lid in isometric projection.

Most candidates managed to draw a lid that can close the suggestion box opening. Although some lost marks for not drawing it in isometric projection. Candidates were in a liberty of using free hand or use isometric instruments to draw the lid.

(iii) Candidates were required to draw a design of the lid handle and show how to attach it.

Most candidates were able to come with some interesting handle designs that can work, although some failed to show the method of fixing the handle to the lid and that led them to lose some marks.

Question B5

Water bottle parts to be assembled

This question was also derived from a real 'Graphic Product' and it was the least popular question compared to **Question B4**, only 19 candidates who opted for this question.

Front view

(a) Candidates were required to draw a sectional front view of the assembled water bottle following the cutting plane X-X using scale 1:2.

Most candidates who attempted this question managed to draw the sectional front elevation of the trophy. However, some candidates had a challenge in finding the centers of the radius 50 mm arcs that requires the principle of circles in contact and that led to a loss of marks. Measurements were a problem as some candidates were providing incorrect measurements, which cost them valuable marks. Some candidates used 30° and 60° to show the hatching of the sectioned view, others did not label the sectioned view **SECTION X-X** which was also expected to be indicated.

End view

(b) Candidates were required to complete the end view.

Most candidates who attempted this question were able to complete the end view by adding the missing handle. Most candidates did follow the principles of first angle orthographic projection correctly, the only thing that need to be improved is the quality of lines and accurate measuring.

EGCSE DESIGN AND TECHNOLOGY

Paper 6902/03

Resistant Materials

Key massages

Candidates need to read questions very careful and have a clear understanding of what the question requires of them before attempting an answer.

For candidates to achieve good marks for Section A, they need to develop a wide knowledge and understanding of materials, tools and processes used when working with wood, metal and plastic.

Candidates need to improve their communication skills especially in section B. They must try to provide clear sketches when answering questions that start with the statement: ***Use sketches and notes to***… In addition, notes should enrich and make clearer what they have been drawn and not just to simply state the obvious. It is vital that candidates **do provide sketches** with notes otherwise they deny themselves access to maximum marks.

General Comments

This paper consists of two sections, Section A and Section B. Candidates were required to answer all questions in Section A and then proceed to answer Questions**11, 12 or 13**. Most candidates in all centres followed the instructions. Candidates still showed challenges in understanding and execution of basic skills and technique in working with materials. When showing processes using sketches and notes, they should show the correct tools used to carry out the tasks including the holding and supporting tools.

Section A

This section testing knowledge and understanding is concerned with materials, tools and processes used when working with plastic, metal and wood. The syllabus requires that candidates should have an all-round knowledge and understanding of the three content areas named herein to perform well in this Paper.

Comments on Specific Questions

Question 1

This question showed a plastic bucket.

(a) ***Candidates were required to name a suitable material for manufacturing the bucket.***

Very few candidates name the suitable plastic for the bucket manufacture shown in Fig.1, candidates were just naming any plastic they know e.g.; expanded polystyrene, ABS and acrylic and they were marked wrong. Successful candidates gave High-Density Polythene(DDPE), and Polypropylene as the correct response.

(b) Candidates were to give one reason for using those plastic.

Most candidates gave the correct reasons which included that the plastic comes in wide range of clours, easily molded and water proof**.**

Question 2

This question showed a tool on a lathe. Candidates were required to:

Name the tool and state its use.

This question was poorly done as they were very few candidates who name the tool correctly and they could not give the correct tool use as they had no idea of the tool. The examiner expected candidates to name the Centre drill or combination centre drill which is used to locate center on a rod mounted on lathe or start a hole on lathe.

Question 3

This question required candidates to name one knock-down (K- D) fitting used in flat pack furniture.

A majority of candidates had no idea of a knock-down fitting used in flat pack furniture. The examiner expected the following responses; block-joint, plastic/wood corner block, two block fitting (lock joints), modesty block, scan fittings, fastenings, rigid joint as correct responses.

Question 4

This question required candidates to match the given adhesives with the most suitable use.

Majority of candidates were able to score good marks by matching the adhesives and the uses, but some had no idea about the epoxy resin and polymer cement. Those who scored good marks were able to match the glue stick with solid glue used to bond paper to paper, PVA matched with general purpose glue, epoxy resin for a two-part adhesive creating a strong bond between most materials while a hot glue is used for model making or temporal joints and the polymer cement is used to join plastic to plastic.

Question 5

This question required candidates to describe health and safety precaution to be considered other than wearing personal protection equipment to be followed.

When using a chisel in the workshop.

Majority of candidates were able to state that one should keep all parts of the body behind the cutting edge of the chisel, hold your work firmly in the vice or hand the chisel to someone by the handle

When facing off a Ø20mm aluminium rod.

Few candidates were knew about facing off a rod on a center lathe, therefore most candidates could not give a correct safety precaution other than wearing a protective clothing. Successful candidates gave precautions such as work/tool should be securely held in the chuck, use correct turning speed, use correct cutting tool, one man one machines.

When working with contact adhesive.

Most candidates where able give a correct response which included working in a well ventilated room and avoid adhesive contacting the skin.

Question 6

Candidates were required to name a tool that can be used to mark out a corner bridle joint also name another tool used for cutting the joint.

Quite a number of candidates were able to name steel rule, pencil, mortice gauge as marking tools but there were some candidates who mentioned a marking gauge and there were marked wrong. For cutting the bridle joint the examiner expected the following responses tenon saw, coping saw and dovetail saw.

Question 7

Candidates were to explain why the blade of a hacksaw can be fixed at 90° to its normal position.

Very few candidates had no idea of the fixing hacksaw blade perpendicular to its frame, most were saying it is for cutting in confined spaces. But the examiner was expecting a response that will include; cutting a long cut on a metal or the frame does not restrict depth of cut.

Candidates were to explain why the tenon saw blade has a stiffening rib.

Most candidates did not do well in this question they were giving responses such as it holds the blade from wobbling. Those who gave a correct response mentioned that it helps the saw to cut strait or for accurate cutting.

Question 8

Candidates were to describe how the stool legs were strengthened.

The majority of candidates had no idea about lamination of wood using a former so they lost valuable marks. Very few candidates were able to describe that the wood is cut into strips and glued together around the former clamp it till it dries up, rather than saying that the legs are thickened.

Candidates were to describe how to strengthen a high carbon steel firmer chisel blade.

Very few candidates describe that the chisel blade is hardened and tempered to make it strong. Those who scored good marks were able to describe that the blade is heated to cherry red then quenched in water or oil then cleaned and reheated gently until the correct oxide colour forms and quench again to make it less brittle.

Question 9

Candidates were to give two reasons why is it important to evaluate designs.

Majority of candidates were able to state the two reasons to evaluate designs. The most popular reasons were that it is done to select the best design and it is evaluated for further modification. The examiner was expecting responses that includes to make judgment, for further improvements see success and failures if the designs.

Question 10

Candidates were required to explain what is meant by:

Tempering.

Most candidates had no knowledge of heat treatment, they were giving responses which talks of cooling a metal to make it hard. Very few gave a correct response which is the removal of the extreme hardness or making hardened steel tougher.

Annealing.

Most candidates were able to give a correct response by stating that annealing is making a metal soft or to relieve internal stresses so that the metal can be easily worked on.

Section B

Question 11

This question was the second popular question as there were 149 candidates who answered it.

A child's toy.

(a) (i) Candidates were required to suggest a suitable material for making the metal guide rail.

Majority of candidates were able to give aluminium, mild steel or stainless steel as a correct response. They also gave an accurate reason for their choices, which includes that aluminium is light in weight and self-finish, stainless steel resist corrosion, mild-steel is easy to shape, if aluminium.

(ii) Candidates were required to suggest a suitable material for making the wooden support.

Most candidates provided appropriate SAP for the wooden support as a suitable material. Although some were giving irrelevant materials such as plywood which is too thin for that support. Successful candidates gave any hard or soft wood, MDF and gave reasons such as hard for hardwood, easy to work, can finish well.

(iii) Candidates were required to suggest a suitable material for making the plastic bead.

Most candidates who answered this part did fairly well they were able to state nylon, HDPE, acrylic. They gave reasons such as self-lubricant for nylon, it can come transparent or different colours, tough, rigid, wear resistant.

(b) Candidates were to describe using sketches and notes how to make the different parts of the child's toy using the chosen material in (a)

(i) Making the plastic bead.

Quite a good number of candidates managed to describe how they could make the bead and they scored good marks. Most of opted to vacuum form to make it or press forming which leave a problem of joining the two formed parts together. Those who scored good marks showed how the plastic is heated then injected into the mold then drilled the hole for the guard rail. Very few opted for blow molding process which was also applicable in this case. Although some used hand tools to shape a plastic block into the bead.

(ii) Cut the wooden support to shape.

Majority of candidates were able show how the waste is removed with coping saw, bend saw or scroll saw. Some candidates did not show how the rough sawn wood is made smooth using file, spokeshave and sandpaper, others did not give relevant a annotations, this led them to lose marks.

(iii) Candidates were to show using sketches and notes how to join the metal guide rail to the wooden support.

A good number of candidates managed to show the two parts together, although most of them did not show how to secure the parts from making any movement. Those who scored good marks were able to show an appropriate joining method for the two dissimilar materials, secure the parts together and have relevant annotations.

(c) Candidates were required to describe how to anneal the metal used to make the guide rail if it hardens.

Very few candidates had an idea of this kind of heat treatment process, some were hardening the metal especially those who chose steel and those who chose aluminium had no idea at all. The examiner was expecting those who selected steel to describe that it is first heat the steel to bright red followed by soaking it for short time then leave it to cool slowly.

For those who selected aluminium were expected to describe that the aluminium must be covered with soap first, heat the aluminium slowly gently until the soap turns black then leave it to cool.

(d) Candidates were to describe how to apply paint to the wooden support if it has no knots.

Most candidates did perform very well in this question. Although most candidates had no knowledge of keying the surface with a glass paper at 45° before the application of a primer or undercoat then the top coat.

Question 12

This question was the most popular question as there were 171 candidates opted for this question.

A scissor storage rack used in a school Fashion and Fabric studio made of 5mm thick plastic was shown.

(a) Candidates were to name a suitable specific plastic that could be used to make the scissor rack and give two reasons for their choice.

Most candidates did very well in naming the suitable plastic. Successful candidates gave acrylic or acrylonitrile betadine styrene (ABS) as a repose and their reasons were that it comes in different coulors, easy to shape, tough, hygienic.

(b) Candidates were required to give a marking tool used to draw lines on the plastic sheet before it could be bent.

Majority of candidates were able to give felt tip marker for their response which were awarded the mark, some gave pencil and scriber and they were marked wrong. Very few candidates who gave wax crayon and chinegraph pencil which are other tools to mark temporal lines on plastic.

(c) Candidates were to name a saw that could be used to cut out the plastic sheet. Most candidates were able to name any fine toothed saw such as coping saw, scroll saw, junior hacksaw and hacksaw.

(d) Candidates were required to describe how to finish the plastic edges after being sawn.

Majority of candidates were able to describe how the edges of the rack could be finished after sawing. Most candidates stated that the edges are first filed to the finished lined, then they are made smooth by using wet/dry paper, lastly they are polished using a buffing wheel with polishing compound to come up with the desired smoothness.

(e) (i) Candidates were to show by sketches and notes how one slot is cut from a flat plastic sheet.

Majority of candidates managed to sketch the slot being cut using a coping saw, although some lost marks for not showing that a hole is to be drill first to insert the coping saw or scroll saw blade. Those who scored good marks showed the drilled hole to insert the saw blade which is used to cut out the waste from the marked slot.

Then they also showed slot filed using a file down to the finish line and have relevant notes. Lastly they showed how the work securely held during the cutting processes.

(ii) Candidates were required use sketches and notes to show how to bend the plastic sheet to make the scissor storage rack.

Fairly good number of candidates managed to show how to bend the plastic sheet using bending jig, although some lost some marks for not showing how the plastic was heated, some did not show that the hot plastic must be retained securely while it cools on the former. The examiner was expecting candidates to show the plastic

heated on a strip heater as there are making straight bends, bend the plastic on a bending jig/former, secure the plastic while it cools to take the required shape and have relevant annotations.

(iii) Candidates were asked to modify the rack so that it can hold some sheet of paper that are 200 mm x 80 mm as shown.

Majority of candidates were able to make some modification as the given requirement and they were awarded good marks. Some lost valuable marks for not considering the paper sizes and for not showing how the paper will be kept straight as required. Others lost marks for failing to make good sketches. The examiner expected candidates to draw good sketch with relevant annotation showing functional modification that will accommodate the papers as shown considering their sizes as they are to be kept flat or straight.

(f) Candidates were asked to list three tools used to make straight bend on aluminium.

Most candidates list one or two tools very few managed to list all three as required. Those who scored good marks gave the following tools; folding bars, engineers vice, mallet, ballpein hammer.

Question 13

This question was the least popular as there were 57 candidates who answered this question.

An Illustration of a mild steel frame chair with a birch seat and a nylon end-cap was given:

(a) Candidates were required to give one advantage of using mild steel over a rectangular bar.

Quite a number of candidates were able to give advantage such as the chair is lighter in weight than when made with the rectangular bar. Some said the tube is easier to weld than the bar which is not correct and they lost the mark.

(b) Candidates were required state a reason of using nylon as a suitable plastic for the end-cap.

Majority of candidates were able to give a reason for the use of nylon in making the end-cap such as it is hard, good fatigue resistant, rigid and self-lubricating and they were awarded the mark. Although there were some who gave inapplicable reasons such as it can crack easily and they were not awarded the mark.

(c) Candidates were required to give a reason for using birch for the seat laminate.

Very few candidate had a knowlede of this hardwood, the gave general responses such as it is easy to work which were not awarded the mark. Those who got the mark gave responses such as it has fine grains, it is hard the seat will be durable, it has atractive grains and durable which were responses needed by the examiner.

(d) Candidates were to name two tools that could be used mark the 45 ° angle of the joint 'A'.

Majority of candidates were able to name a scriber, mitre-square, sliding bevel and a engineers square as a correct response and those were the examiner's expectations.

(e) (i) Candidates were to show by sketches and notes how to mark and cut joint 'B'. Most candidates were able to show the metal marked with a sliding bevel and a scriber and they also showed how the tube is cut using a hacksaw which led them to score good marks. Those who got all the marks they further showed the holding devices when performing the cutting and they went an extra mile by showing the tube being filed to the marked lines and have relevant notes.

(ii) Candidates were required to outline the process of laminating the seat.

Majority of candidates displayed little knowledge of the wood lamination process which led to a loss of marks. The examiner was expecting candidates to show the birch strips glued together in a bending former held by clamps while the glue sets. Then trimmed the seat to the correct sizes and finished to the required specifications, also write relevant notes to aid the sketches.

(iii) Candidates were to show how the end-cap is made.

A fairly good number of candidates were able to sketch showing how the nylon block could be cut to shape using saws and other wasting tools, also showing holding methods with sound annotations, candidates were awarded full marks. Others showed that they can use injection moulding by showing the water cool mould, heating the plastic granules and showing how the molten plastic is forced into the mould, then showed how the end-cap is ejected from the mould and remove the excess material for the finished product.

(f) Candidates were required to describe how to square the tube frame before putting the end-cap.

Most candidates were could not describe how the tube could be squared before inserting the end-cap. Some were able to tell that a line must be drawn with a scriber and an engineer's

square and then filed to the line. The examiner was expecting candidates to tell that a scriber line should be drawn around the tube end using an engineer's try-square, hold the tube as low as possible in the vice then file down to the finish line lastly remove the burrs.

(g) Candidates were to describe in detail how to paint the mild steel tube frame.

Most candidates were describing their inappropriate short cut they doing when painting in their school workshop, that is just applying paint the metal without following the right procedure and they lost valuable marks. Those who scored good marks describe that the tube is thoroughly cleaned, degreased then arrange/support it in readiness for applying the primer followed by undercoat and the topcoat. Lastly clean the painting equipment.

EGCSE DESIGN AND TECHNOLOGY

Paper 6902/04

Project

Introduction

Coursework

Design and Technology Paper 4 is a coursework paper and a school-based component of the syllabus that is compulsory to all candidates registered for Design and Technology. Each candidate undertakes a personally identified project centred on the theme. The project will be worked over the final two terms of the course, then submitted for marking. Teachers carried out the assessment of work as markers and as internal moderators for only one criterion (Product Realisation). Our observation was that there were few candidates that were registered compared to the previous year, we don't know due to what reasons.

Candidate's folders were presented for marking. A decline of ninety-seven centres (97) registered candidates for the coursework compared to one hundred and three (103) centres who were registered in 2021. Of the centres, seven hundred and thirty-seven (737) candidates were registered, seven hundred and nine (709) candidates submitted work for this year's examination. However, there was a serious concern of twenty-eight (28) candidates who were registered but could not submit work for 2022 coursework examination.

General Comments

Generally, the 2022 performance indicated a slight decrease when compared to the previous year. The work presentation displayed on the folios did indicate a decline on performance from both teachers and candidate's commitment and in the understanding of the syllabus requirements. Some centres performed poorly due to learners being misguided by the teachers. Moreover, teachers are requested to guide and encourage candidates throughout the design process.

Folios

It was good to note that all centres used the correct folio paper size. Folios were graphically presentable on A3 size paper and easy to read and to follow, except for one (1) centre that submitted folios in A4 size, they were summoned by the Council to answer for such. Candidates must bind their portfolios neatly and if slide binders are used, it is advisable to **staple** the sheets

together before binding. However, the use of a spiral binder is recommended to ensure that no sheets are lost. Centres should arrange their candidates' folios numerically before submitting to Examinations Council.

It was encouraging to realise a slight decrease in the number of candidates who did not submit their work regardless of 2022 challenges (COVID-19 pandemic and political unrest). **Teachers are encouraged to collect work of learners as they complete each stage of the design process to reduce candidates who at the completion of the work are indicated as absent candidates.**

Comments on specific Assessment Objectives.

Theme analysis

This section was well done by most candidates. Most candidates defined the theme "MOVEMENT" but advised to refer to **at least three sources** for their definitions. It was encouraging to note that most candidates indicated clear understanding of the theme. Few candidates did not indicate the area of interest in the theme analysis. In some centres candidates provided theme analysis [bubble charts] with limited links (must have at least three links). It was good to note that most candidates did not only indicate the area of interest but also indicated at least **four** general areas.

Identification of the need

Most candidates formulated personally identified problems that were relevant to the theme and successfully completed this objective. Centre assessment of this objective was reasonably accurate although few were not realistic and indicated limited guidance from the teacher. Some centres had a tendency to follow a certain area of need identification such as toys, agricultural equipment and food trays or trolleys. It is however, vital that the identification of a need may be accompanied with the evidence to prove the need to design. Most candidates used pictures to better explain the situation. The user must be considered and it is important to explain how the user is affected in the situation. Candidates must clearly indicate if the project will be completed as a model or actual product.

Research into the design brief resulting in a specification.

There was a wide range of responses to this assessment objective. Very good work was seen, that demonstrated an excellent understanding of the objective requirement. Few candidates indicated researches that were not relevant to the design brief (mostly research on material).

Many candidates had evidence of existing ideas, which were downloaded from internet and others in a form of photographs. However, candidates should note that research should have a wide range of existing ideas (**with a minimum of six**). The ideas must not be on a single concept and also include relevant identified and collected data. Most candidates indicated little understanding about the difference between ergonomics and anthropometric data. It was good to note that most candidates included the specification in their research which was clear and concise. It is important that the specification is not only specific but also link with the brief analysis and is a conclusion of the research based on the design brief. On the specifications, teachers should assist learners to align their specification items with the analysis. Candidates are encouraged to include the **function** on their specifications. Some candidates seemed not to understand the meaning of researching on existing ideas, as a result they did not analyse and evaluate their existing ideas. **Candidates must be encouraged to collect relevant data as they research which must align with the design brief.** It was noted that there was an improvement in the summarising of findings of the research.

Generation of ideas.

The standard in attempting this objective was fair. Most candidates produced a wide range of possible ideas, however some ideas were not developed and evaluated against the design specification. Some candidates work demonstrated that they were lacking drawing skills such as enhancement techniques as a result, candidates downloaded ideas straight from the internet. Few candidates displayed good graphic skills and used pens. Generally, the ideas were well rendered and drawn. On another note, candidates should

be discouraged from drawing ideas that tend to focus on a single concept which also resulted in ideas that are similar to existing products, they must also be discouraged from downloading (cutting and pasting) drawings from internet and use them as possible ideas. They must neatly draw ideas either with a pencil, pen or using CAD. Candidates are encouraged to use free-hand sketching when producing ideas, rather than formal drawings, which limits their creativity. In the form of scanning, candidates are also encouraged to produce clear scanned ideas. It is also good to note that almost all candidates were indicating the chosen idea although some were without selection matrix and justification based on the specification points of the intended product.

Development of the proposed solution

In as much as there was an improvement in attempting this criterion but it was still a challenging criterion to some candidates. Candidates must be encouraged to show **at least three changes** for an improvement within the development which should be accompanied by notes that explains

reasons for improvements. It was good to note that some candidates were able to produce appropriate evidence of testing and or trailing resulting in reasoned decision about material, form and construction details. Candidates who did not make mock-ups and tested them, lost marks. It is advised that candidates make mock-ups, test them and clearly state reasoned decisions about form, materials, construction/production methods etc.

What was also of note is that some centres misguided the students in the assumption that a model is a mock up, thus most students who didn't make the model lost marks. Even a model has a mock up, all it is a trimmed version of the actual full size product.

Planning for production

This objective was strength to most candidates. Most candidates performed well, in the sense that they had working drawings, cutting list and part list, Isometric or exploded views and production plans. However, some candidates only came up with the flow chart which did not indicate the sequence of operation. It was observed that most candidates used orthographic projection, although some views had no dimensions. Candidates should be encouraged to include dimensions and scaled writing in their working drawings for this objective. Some candidates were pasting pictures of the realisation stage on the planning for production stage, which is strongly discouraged.

Product Realisation.

The instruction to candidates was that they should make models instead of actual products/projects. This resulted in some confusion with some centres, where most ended on the mock-up stage or going straight to the model while others skipped the mock-up stage and went straight for the model. This objective resulted in a number of candidates losing marks on either stages (testing and trialling (mock-up); and models). It is worth noting that there is a difference between the Mock-up and a Model (as a final product), it is therefore important that all stages be done.

Testing and evaluation

Most candidates tested and evaluated their work, although to some candidates the evaluation was not against the design brief and specification, instead stated general factors about what was done to the product and remarks about problems encountered during manufacture. Few candidates' testing was superficial in that it did not take into account the views of the users or show the product in the environment for which it was designed. It is encouraged that testing should be done

based on the functionality or intended use of the project, not on measurements of the product; which some centres did. Centres are also advised to encourage candidates to test and evaluate their products against the specification and include modifications and also limitations.

Reminder to centres:

- Unlike 2020 where products were required to be full size, this year, just like 2021 the products were required to be models. Teachers are advised not to confuse a model with a mock up or prototype.
- centres are reminded to ensure that marks are added correctly on the Realisation Summary Form.
- Some centres are not doing well, because some lack resources e.g. Camera, computers and printers.
- All centres should have products for realisation internally moderated and clearly show the distribution of the internally moderated mark.

Markers and internal moderators should also consider the following:

- Internal moderators should show mark distribution, not just the total. - The teacher teaching the group should **not** mark and do the internal moderation. That is malpractice rather seek help from teachers of neighbouring schools if you are alone in the department.
- Teacher must check if all documents (summary sheet form and attendance register) are appropriately completed and enclosed inside the provided (ECESWA) envelop before submission.

All centres must adhere to the deadline for submission of folios at ECESWA.