



Pearson

# A level Design and Technology

Analysis of the principal moderator report to highlight good practice.

October 2019

Subject Advisor Support Session

## **Aim of the support session:**

- To go through the moderator report and highlight moderator observations.
- To highlight good practice and expectations
- To answer your questions.

# Part 1

## Identifying opportunities for design

# Grid One: Identification of a design possibility

In this section;

- identify design possibilities and explore them
- come up with initial statement of intent
- have a commercial approach, user centred design.
- have a meaningful narrative with a client or realistic stakeholders.

# Grid One: Identification of a design possibility

## Moderators observations:

- This section was rather weak across the whole of the submission which then went on to affect the Research and the Specification. Rarely completed to a reasonable standard.
- Too much evidence of product led rather than client/stakeholder/market led solutions at this early stage.
- It appeared that the candidate knew what they wanted to make and retrospectively fitted a willing 'client' into the token role of a client.
- there were centres that did not recognise the need to design for a client or user group.
- In the best cases we saw the candidates identifying somewhat broader areas of possibility, and narrowing this down to a design problem to work on. E.g. from sustainable housing (broad) - narrowing down to designing a house near a river (land information provided) and aiming for 100% sustainable living (client based).

# Grid One: Identification of a design possibility

## Assessment criteria

Evidence of in-depth investigation of pertinent design possibilities.

Effective identification and justification of a design possibility.

Comprehensive investigation of the needs, wants and values of the client/end user to inform design requirements.

*Working closely with the client, learners should consider and discuss different design possibilities, investigate these to come up with a justified design possibility and write an initial statement of intent, highlighting the design problem to be solved.*

## Expectations:

- Identify a suitable *client* (target market, local business, individual client) // user centred design.
- Comprehensive investigation of the *needs, wants and values* of the client/end user to inform design requirements.
- In-depth investigation of pertinent *design possibilities* in consultation with the client.
- Identification and justification of **the design possibility** and coming up with an initial statement of intent (an initial design brief).

# Grid Two: Investigation of needs and research

In this section:

- a clear plan of action in terms of the research, the needs, wants and values of the client/stakeholders are needed.
- a perceptive selection of both research sources and a sound linkage between the design needs and the research undertaken must be evidenced.
- the research must have a justification that relates to the design context.

# Grid Two: Investigation of needs and research

## **Moderators observations:**

- lack of clear links from client's needs to the needs of their design,
- interviews with the client or user lacked credibility and failed to draw out the pertinent details needed.
- detailed research, however not analysed, summarised or concluded, to inform next stages.
- Some generic research, including superficial product analysis, site analysis (architecture)..., which did not inform design decisions.
- Lack of focused/selective research and conclusion, informing the next stages.



# Grid Two: Investigation of needs and research

## Assessment criteria

Comprehensively developed assessment of the needs, wants and values of the client.

Comprehensively developed assessment of the needs of the prototype with pertinent consideration of form, function, sustainability and level of production.

Perceptive links between the design needs and the research undertaken.

Perceptive selection of research sources, including existing products, ergonomic information and standards, which provide perceptive insight to the design context, showing a comprehensive understanding of the design possibility and related design problems.

*Learners should make a detailed analysis of the design problem with regards to the needs, wants and values of the user and the need of the prototype.*

*...and selectively plan and research all relevant information, conclude and inform design decisions.*

## Expectations:

- Plan research to make sure the client information is comprehensively investigated.
- Plan research to make sure necessary information for the design context is investigated
- Conduct focused research, such as product analysis, ergonomics research, site analysis, other relevant research to inform design decisions within its context.
- Have meaningful client narrative which influences the research undertaken. *E.g. from a discussion, learner had realized a new point to investigate.*
- Conclude research to show how each research contributes to the next stages of the design process.

# Grid Three: Specification

In this section;

- A fully reworked design brief that reflects the client's needs and the outcome of the investigation.
- Specification points that are realistic, technical and measurable.

# Grid Three: Specification

## **Moderators observations:**

- A range of specification points were written.
- Lack of developed design brief, following on from research.
- Candidates who failed to conduct focused and detailed research then produced specifications that lacked details, had limited justifications and were generally superficial.
- Lack of technical and measurable criteria in the specifications.
- Sustainability referred to superficially.

# Grid Three: Specification

## Assessment criteria

Comprehensive design brief that fully reflects the investigated needs, wants and values of the client/end user.

Comprehensive range of specification points which are realistic, technical and measurable in relation to a sophisticated design problem

Perceptive justification of the performance requirements for the prototype.

*Following on from the in-depth research, learners should write their improved design briefs, and a list of technical, measurable and a justified range of specification points.*

## Expectations:

- Create a comprehensive design brief that fully reflects the investigated needs, wants and values of the client.
- Create a comprehensive range of specification points which are realistic, technical and measurable in relation to a sophisticated design problem.
- Use research information effectively to write the design brief and the specification points for the design and prototype.
- Learners should make sure their research was effectively conducted, so a strong set of specification points can be written.



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## Part 2

### Designing a prototype

# Grid Four: Design ideas

In this section;

- a range of design ideas that are realistic, workable and address the criteria in the specification criteria from the previous section
- candidates should be thinking like a commercial designer and apply their knowledge of technical skills and materials and back it up with the research they have carried out previously
- be imaginative and draw inspiration for many areas such as nature, industry, design movements and new technology.

# Grid Four: Design ideas

## **Moderators observations:**

- good alternative ideas were presented.
- the use of detailed subsystems to explain the concepts in more detail were often missing.
- lack of information on potential materials, processes and techniques that could be used use, in annotations.
- Descriptive comments, rather than more analytical.
- Candidates may benefit by exploring ideas in more detail using part sketches and exploded diagrams.
- Range of design strategies used. Some more sophisticated strategies could be utilised.

We did see some excellent design work that was supported by very astute technical annotation which was very heartening. These candidates had a mastery of the graphic communication skills required and adopted a very creative approach to the resolution of the design issue that they had explored and the brief that they had developed. They also evidenced the client narrative that allows for an iterative approach.



# Grid Four: Design ideas

## Assessment criteria

Sophisticated selection and use of design strategies to inform decisions.

Present ideas that show an in-depth consideration for the user needs and specification parameters.

Accomplished use of aesthetic features with perceptive consideration of historical and cultural influences showing an in-depth understanding of the intended use of the prototype.

Ideas demonstrate an in-depth understanding of relevant materials, processes and techniques.

*By using a sophisticated range of design strategies, present ideas that show in-depth consideration of user needs and the specification points, which stemmed from the research undertaken. Demonstrate accomplished use of aesthetic features, which also demonstrate historical and cultural consideration. Ideas should also demonstrate understanding of materials, processes and techniques.*

## Expectations/Good practice:

- Design ideas/proposals should show imagination, creativity and innovation.
- Design ideas should demonstrate learners ability to pick and use appropriate design strategies.
- Design ideas should evolve with discussions with the client/end user and by targeting specification points.
- Show source of inspirations for both functional and aesthetic aspects of the design, including historical and cultural influences.
- Design ideas should graphically showcase the idea with various sketches/drawings/CAD models/models in detail. E.g. main view, other important views, some detail views, sub-systems...
- Annotation should be in detail and support the ideas, including in-depth understanding of relevant materials, processes and techniques.

# Grid Five: Development of design ideas

In this section;

- Show a perceptive use of research to inform ongoing developmental changes.
- Demonstrate accomplished use of an iterative approach to the development of a design solution, including perceptive input of client feedback to inform decisions throughout the process.
- Show how changes and alternatives to designs are informed by the in-depth application of technical knowledge of materials and processes.
- Demonstrate a sophisticated application of modelling/simulation techniques to inform decisions showing an in-depth understanding of the need for testing in the development of a final prototype.

# Grid Five: Development of design ideas

## Moderators observations:

- limited evidence of an iterative approach here.
- CAD software packages, used mainly to present ideas and not as a development tool.
- lack of on-going research, having an overall effect on the development.
- Lack of client consultation. Where candidates had good communication with the client, the development seemed to be stronger.
- Some examples of good use of modelling, where it informed development, such as modelling to test a detail of the design.
- Good use of annotation showing research undertaken, client discussions, testing, technical details and more...

***For instance***, we did see some good examples of mechanical modelling of the reverse motion linkage systems for a cantilever folding style table including some calculations... modelling allowed the candidate to look at the size and weight of the top and discuss this to good effect with the client.

# Grid Five: Development of design ideas

## Assessment criteria

Perceptive use of research to inform ongoing developmental changes.

Accomplished use of an iterative approach to the development of a design solution, including perceptive input of client/end user feedback to inform decisions throughout the process.

Changes and alternatives to designs are informed by the in-depth application of technical knowledge of materials and processes.

Sophisticated application of modelling/simulation techniques to inform decisions showing an in-depth understanding of the need for testing in the development of a final prototype.

*With many iterations, using client feedback, further research, modelling, testing, CAD and more... learners should develop their design and solve all details ready to be prototyped.*

## Expectations:

- Use timely research and client feedback to identify, work on and solve problems to develop design into final design.
- Use modelling and testing to solve details, test solutions, inspect design development...
- Good use of other design strategies and tools to further develop the design. (Would a CAD model help solve a detail? Can I simulate the part in CAD environment to see how a detail works?...sketching over tracing paper, to find the best form for X part of the product)
- Include technical annotations and explanations in the development, to clearly show thinking and how the design is evolved.

# Grid Six: Final design solution

In this section;

- Make final refinements and present a detailed final design solution that enables third party manufacture to take place.
- produce a manufacturing specification that details the technical information needed for manufacture.
- Include, cutting lists, parts drawings, a tabulated illustration of the operations that need to be undertaken on each part including tools, processes etc.
- Include calculations.

# Grid Six: Final design solution

## **Moderators observations:**

- Necessary technical information missing
- Dimensioned drawing available, however not enough construction details evident. E.g. use of exploded drawing.
- Superficial manufacturing specification.
- Rare to see cutting lists,
- Lack of details in technical drawings, such as, a part drawing lacking some dimensions.
- Calculation of costing was good to see.
- Final design drawings reviewed by the client or tested against the design specification, was good to clarify the requirements of the prototype.
- Where this section was completed well, we saw very good detailed final drawings often using CAD and each operation that contributed to the manufacture detailed therefore evidencing the candidates understanding of a range of tools materials and processes.

# Grid Six: Final design solution

## Assessment criteria

A manufacturing specification that comprehensively addresses the needs and wants of the client/end user is presented that includes comprehensive technical details to allow fully accurate interpretation by a third party.

Sophisticated refinement of design proposals to generate a design solution that comprehensively meets the requirements of the design specification.

Accomplished project management including application of calculations to determine material quantities and costs related to the production of the prototype, showing a thorough understanding of methods which can be applied to reduce wastage.

*Learners should present their final design, ready to be prototyped. There should be enough technical information for a 3rd party to manufacture the prototype, including cutting lists, part drawings, calculations of material quantities and cost, detail drawings, exploded drawings, CAD files... The final design must also be presented effectively...*

## Expectations:

- As part of a the manufacturing specification, there should be enough technical details, such as cutting lists, orthographic drawings, exploded diagrams, CAD files, details about the tools and processes to be used...
- Calculations of materials, wastage, cost, should be presented.
- Include a presentation of the final design, in different views, showing different aspects of the design...
- Use of CAD - Creating a well dimensioned detailed CAD model would help in generating rendered views of the design as well as technical drawings/part drawings/exploded diagrams/sections.
- Show construction details.



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# Grid Seven: Review of development and Final Idea

In this section;

- undertake an intellectual analysis of the work undertaken so far,
- include commentary that is analytical and evaluative,
- there should be strength and weakness analysis that provides balance,
- the evaluative element must be balanced and ensure that any conclusions undertaken can be supported,

# Grid Seven: Review of development and Final Idea Pearson

## **Moderators observations:**

- Evidence for this section can be in different parts of the portfolio, in the work that learner has produced up to final design. This includes, evaluation of design proposals, evaluation of the work of others...etc.
- Evaluation lack balanced when feedback from client was not in great detail.
- Evidence of good techniques of evaluation, such as evaluating after each idea, however this lacked detail. Evaluative comments should help design move forward and not only be descriptive.
- Lack of or not utilising regular client feedback and making clear design decisions about each aspect of their designs affected this section.

Candidates failed to realise that the work in this section must be analytical in nature; it must review the development from client feedback, and the evaluative commentary must have some balance in terms of advantages and disadvantages, but more importantly a full dialogue throughout where the client/stakeholders is consulted, and the design moves forward from these discussions. Candidates should also be incorporating new research at this stage (design and development) or go off at tangents to meet with other experts to help solve certain problems. Experimental modelling in 3D or by CAD will also inform the review of the development by moving the design forward. This is a section of the assessment criteria that requires attention in future submissions if the candidates are to access the very highest levels of this criterion.

# Grid Seven: Review of development and Final Idea

## Assessment criteria

Comprehensively developed analysis of the refinements made to designs through the development process, pertinently supported by references to feedback made by others and consideration of materials, components and manufacturing techniques.

Perceptive and balanced evaluation of the refinements made to designs through the development process, which is used to draw perceptive conclusions about the appropriateness of the final prototype in meeting the needs of the specification.

Comprehensively developed analysis of the designs and prototypes made by others, which considers a comprehensive range of factors and makes comprehensive connections between elements of the design.

Perceptive and balanced evaluation of the designs and prototypes made by others, which is used perceptively to inform their own design decisions.

## Expectations:

- Analysis and evaluation of on-going development work, informing next stages.
- Analysis and evaluation of other designs, prototypes to inform design decisions.
- For final review, there should be strength and weakness analysis that provides balance and should consider all factors such as materials, processes, techniques and have reference to feedback.
- For final review, evaluation should be balanced and supported by client feedback.
- Analyse and evaluate the final design in meeting the design specification.

*This section looks back at the design journey and looks how well analysing and evaluating own and others designs and prototypes developed an initial design into a final design.*

# Grid Eight: Communication of design ideas

In this section;

- Demonstrate a perceptive selection and accomplished use of traditional/manual graphical techniques to communicate design proposals.
- Demonstrate a perceptive selection and accomplished use of computer-aided design (CAD) techniques to communicate design proposals.
- Demonstrate a perceptive selection and accomplished use of written techniques to communicate design proposals.

# Grid Eight: Communication of design ideas

## **Moderators observations:**

- Graphical work was well assessed by centres and saw candidates using a wide range of graphic techniques including 2D, isometric, perspective and orthographic.
- Written work was also appropriate to the design work and candidates were able to annotate in some detail.
- CAD still not being utilised as much.
- Good example of CAD use were seen, such as, use of 3D CAD software, circuit schematic software, circuit board software, electronic programming software, graphic design software for graphics and textiles drawings, photographic manipulation software and 2D CAD vector based drawing package.

# Grid Eight: Communication of design ideas

## Assessment criteria

Perceptive selection and accomplished use of traditional/manual graphical techniques to communicate design proposals.

Perceptive selection and accomplished use of computer-aided design (CAD) techniques to communicate design proposals.

Perceptive selection and accomplished use of written techniques to communicate design proposals.

*Use appropriate graphical, written and CAD techniques to communicate design ideas and development effectively.*

## Expectations:

- Use traditional graphical techniques such as, sketching, drawing, modelling, perspective/orthographic/other drawings, presentation techniques..etc.
- Use appropriate CAD packages for the required work. CAD work can enhance design work, presentation, help solve problems and speed up the process.
- Good use of written techniques, including annotations, conclusions, evaluations...etc.



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# Part 3

## Making a final prototype



# Grid Nine: Tools and equipment

In this section;

- A sophisticated selection of materials, fixtures, components and fittings which are fully appropriate for the final prototype, showing an in- depth understanding of material properties, the requirements of the end user, and the intended purpose of the prototype.
- Accomplished use of tools, equipment and techniques to prepare materials for the manufacture of the prototype, showing an in-depth understanding of the need for dimensional and geometric accuracy.
- A consistently high degree of safe working practice for self and others
- A sophisticated application of an iterative approach to manufacture to produce a prototype showing how candidates adapt/extend their making to solve problems as they arise.
- Photographic evidence of candidates working on the production of the prototype and documented evidence of the selection of materials, fixtures, components, tools and manufacturing techniques.

# Grid Nine: Tools and equipment

## **Moderators observations:**

- Some projects were too simplistic and lacked enough rigor, which seemed to stem from a simplistic starting point, or lack of development.
- Manufacturing diary is a valued evidence for this section.
- Evidence in the manufacturing diary did not always show the materials, skills, processes used effectively and did not demonstrate learners ability.
- in 'graphics' style projects especially architectural models there were missed opportunities to use materials creatively to mimic the real equivalent materials.
- Lack of complexity in projects and processes (e.g. depending heavily on CAM in simplistic projects)
- There were some exceptional products especially in terms of furniture and outdoor pursuits products and when architectural models were done well, they were also of the highest quality mimicking commercial modelling but using a range of materials and processes.

# Grid Nine: Tools and equipment

## Assessment criteria

Sophisticated selection of materials, fixtures, components and fittings which are fully appropriate for the final prototype, showing an indepth understanding of material properties, the requirements of the end user, and the intended purpose of the prototype.

Accomplished use of tools, equipment and techniques to prepare materials for the manufacture of the prototype, showing an in-depth understanding of the need for dimensional and geometric accuracy.

Demonstrate a consistently high degree of safe working practice for self and others.

*By using various, suitable advanced level skills and processes, learners are to produce a prototype from appropriate materials, fixtures, components and more. Learners should demonstrate safe working and manufacture a well made prototype, with accuracy!*

## Expectations:

- A detailed manufacturing diary, covering safety, tools, skills and processes used to make the prototype is a useful tool for this section.
- Show selection of materials, fixtures, components and fittings, which are selected because of their properties and suitability for the prototype. (Justified selection)
- Demonstrate the need for accuracy, attention to detail and accomplished use of tools and processes. This can be evident in the manufacturing diary with photos and annotations.

# Grid Ten: Quality and Accuracy

In this section;

- Produce a prototype that demonstrates accomplished making skills at an advanced level in relation to a sophisticated design problem.
- Produce a fully functional prototype which matches the end user needs that can be tested and evaluated.
- Produce a prototype that fully meets the design specification.
- Demonstrate a sophisticated application of an iterative approach to manufacture to produce a prototype.

# Grid Ten: Quality and Accuracy

## **Moderators observations:**

- (top end) excellent making was demonstrated with superb quality and finish.
- Lower end of the range, dimensional accuracy was poor and finishing was often neglected.
- Where the photographic diary was missing the assessment of the manufacture became somewhat harder.
- Lack of advanced making skills.
- Some good use of iterative manufacturing.

# Grid Ten: Quality and Accuracy

## Assessment criteria

Produce a prototype that demonstrates accomplished making skills at an advanced level in relation to a sophisticated design problem

Produce a fully functional prototype which matches the end user needs.

Produce a prototype that fully meets the design specification.

Sophisticated application of an iterative approach to manufacture to produce a prototype.

*Learners must produce a prototype using advanced level skills, the prototype should fully function and meet the design specification.*

*Where and when necessary iteration should take place during manufacture to make sure the prototype meets the requirements.*

## Expectations:

- evidence of accuracy leading to a quality artefact that is fully functioning prototype that meets the end user needs identified in the specification.
- consult with the interested parties and amend the design during manufacturing, as a result of this consultation or indeed in response to issues during the manufacturing process - (iterative manufacture).
- ensure that the quality of finish is at the highest level and the finished prototypes are accurate.
- Use the manufacturing diary to demonstrate making skills as well as the final complete prototype.



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# Part 4

## Evaluating own design and prototype



# Grid Eleven: Testing and evaluation

In this section;

- Analysis / evaluation / testing of the prototype, (taking into account refinements and iterations implemented during the development) against:
  - The needs and wants of the client
  - A comprehensive range of the specification points including those which are realistic, technical and measurable in relation to a sophisticated design problem
  - The intended purpose of the prototype.
- Analysis / evaluation of the social, moral and ethical impact of materials and manufacturing processes.
- Analysis / evaluation of the impact on the environment including life-cycle analysis of the final prototype.

# Grid Eleven: Testing and evaluation

## **Moderators observations:**

- Testing against the design specification was almost always seen along with client testing.
- Lack of technical measurable specification points had a negative impact on testing.
- Modifications after testing were occasionally presented.
- Life cycle analysis of the final prototype was presented but often these were generic and lacked real detail and analysis.
- Need to include more detailed testing with client or user groups. It should be encouraged to test the product in use, in its environment.
- Client feedback which is key in evaluating the success of the whole process was on occasion limited to subjective views.

# Grid Eleven: Testing and evaluation

## Assessment criteria

Comprehensively developed analysis of the prototype, taking into account refinements implemented during the development and the client/end user specification, showing a perceptive approach to testing against most measurable criteria.

Perceptive evaluation of the prototype, taking into account the iterative design process and the intended purpose of the prototype, drawing balanced conclusions from testing against measurable criteria.

Comprehensively developed analysis of the social, moral, ethical and environmental impact of materials and manufacturing processes of the prototype

Perceptive evaluation of the social, moral, ethical and environmental impact of the prototype.

*Learners should test and evaluate their final prototype, against the specification, by analysing the final outcome, testing it in use...etc.*

*Client testing and evaluation will be most valuable.*

## Expectations:

- In this section we are looking for the candidate's ability to discern the difference between testing and evaluating. The notion of testing implies putting the product into service and considering its success, especially in terms of the specification and the clients' needs wants and values, whereas in the evaluation phase we are looking for a critical review including strengths and weaknesses which will then give a balanced conclusion supported by all of the analysis undertaken. This could lead to further suggested modifications therefore illustrating a post manufacture iterative approach. The definitions in appendix 5 of Analyse and Evaluate in the specification may help with candidate's further understanding.
- product should be tested in the environment it was designed for.
- Utilise social media for testing and gathering feedback.
- Complete a focused life-cycle analysis to check the impact of the prototype.
- Detailed client feedback!
- In future submissions, candidates should be encouraged to test with reality and provide balance in their evaluation alongside a related analysis of moral and social aspects whilst taking account of environmental concerns.

# Summary

- Have a client and work closely with the client! - User centred design.
- Use client feedback, discussions as bases for iteration throughout the design journey.
- Research and investigate appropriately and timely to inform design decisions. Research must be relevant, selective, detailed, analysed and evaluated.
- Use various design strategies, design communication techniques and other tools effectively to develop design.

# Summary

- Clearly show where decisions are coming from, including from research, discussions, inspirational work...etc. Annotations should be used effectively to help communicate design work.
- Include various information in final design, such as, dimensioned orthographics, exploded diagrams, sections, CAD files, cutting list, material list and wasting information, time plan, part drawings, final rendered views...etc.
- Manufacture the final prototype to highest quality, using appropriate materials/components, manufacturing techniques, and iterate to make sure prototype is finished to be tested against measurable criteria and evaluated in detail.



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# Keep up to date:

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