Design and Technology

A LEVEL

Product Design: Testing and Evaluating

Topic Exploration Pack

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OCR
Oxford Cambridge and RSA

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Introduction

When students have completed the making of their products, they will need to test how well their product meets the requirements identified in their design specifications.

Careful planning and the setting/monitoring of suitable **deadlines** will be essential to allow sufficient time at the end of their projects to complete this section. Along with Sections 6 (Marketing) and 7 (Review and Reflection) it accounts for 33 marks – over a quarter of the whole marks available.

Students should use and develop skills gained in AS units F521 Advanced Innovation Challenge and F522 Product Study when tackling this section.

Mark Scheme

5 TESTING and INDEPENDENT EVALUATION of the FINAL PRODUCT	Show evidence of the testing of the final product against the specification. Identify and state strengths and weaknesses in the product. Respond to independent evaluation	9
Shows evidence of thorough testing of the final product against the specification. Identifies and clearly states the strengths and weaknesses in the product. Responds positively to in depth independent evaluation of the product.		7-9
Shows reasonable evidence of testing of the final product against the specification. Identifies some strengths and weaknesses in the product Shows a reasonable response to some independent evaluation of the product.		5-6
Shows limited or no evidence of testing of the final product against the specification. Identifies few strengths and weaknesses in the product. Shows a superficial response to limited independent evaluation of the product.		0-4

There are **three requirements** for candidates' responses if they are to satisfy the assessment objective **(T I S)**:

1. **Testing to the Specification**
2. **Independent Evaluation**
3. **Strengths and Weaknesses**

As a guide **3 pages** should be submitted and a mark **out of 3** should be awarded for how well each section is addressed.

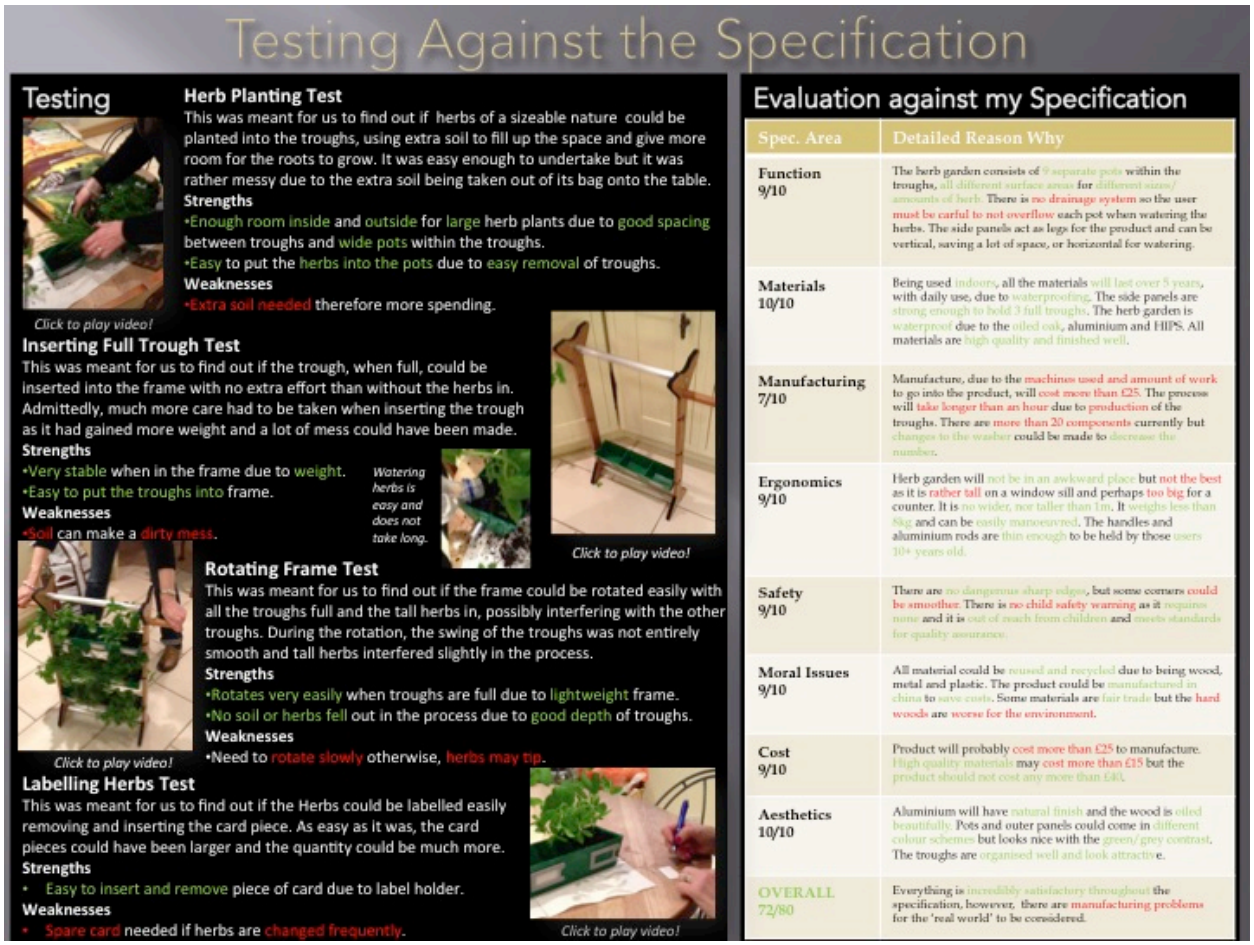
Guidance

Remind students that they are testing their **actual products**. They are **NOT** commenting on the project or the process of designing and making, as that will be marked in section 7.

Testing to the Specification

Example page

This topic exploration pack is accompanied by Teacher's support slides, which can be found on http://www.ocr.org.uk/qualifications/as-a-level-gce-design-and-technology-product-design-h053-h453/



Students should devise a series of **physical tests** to determine how well their product performs. The finished product needs to be tested in its **intended location**, preferably by its intended user or a suitable consumer to be legitimate.

It should ideally be subjected to all the expected conditions that it would face during the phases of its life - its suitability in all situations and conditions in which it may be placed, used, consumed, stored, packaged, or transported. **Evidence** of this testing must be provided in the form of photographs and/or video clips. A concise account of the testing and the results should be written up with key strengths and weaknesses highlighted/discussed.

A **formal evaluation** against the specification should also be written up. Detailed analysis/justification is required rather than a tick list of spec points. Colour can be used to highlight potential strengths and weaknesses identified.

Common student misconceptions:
No evidence of any actual tests, testing their product in the school workshop, superfluous /inappropriate tests, a lack of detail in the written evaluation.

Suggested Activities

Peer assessment

Mark examples of Section 5 from previous years or from examples provided by OCR – focus on a mark out of 3 for each component – Testing/Evaluation, Independent Feedback and Strengths/weaknesses

Product Analysis

After watching the iTunes videos on testing (see resources) working individually or in pairs students select an existing product from their chosen material focus. They first identify then describe and justify a range of suitable physical tests that could be carried out on the chosen product. A whole group plenary can be used at the end to assess the suitability of each test.

Preparation/homework assignment

Using a similar form to the one shown below, have students plan their own testing by describing and justifying a range of suitable physical tests appropriate to their product.

Product Design – Homework Assignment	**HAND IN MONDAY**

Testing – Preparation

Describe **three** appropriate tests that could be carried out on your product to determine its effectiveness

For each test describe:

a) A **name** for the test
b) What the test would **involve** (a sketch would be useful)
c) **Why** that particular test would be useful for your product
d) How **well** (you believe) your product would perform

Test 1	**Test 2**	**Test 3**
Name:	Name:	Name:
Show me:	Show me:	Show me:
Why do it?	Why do it?	Why do it?
How will it do?	How will it do?	How will it do?

Student Worksheet 1

Evaluating against a specification

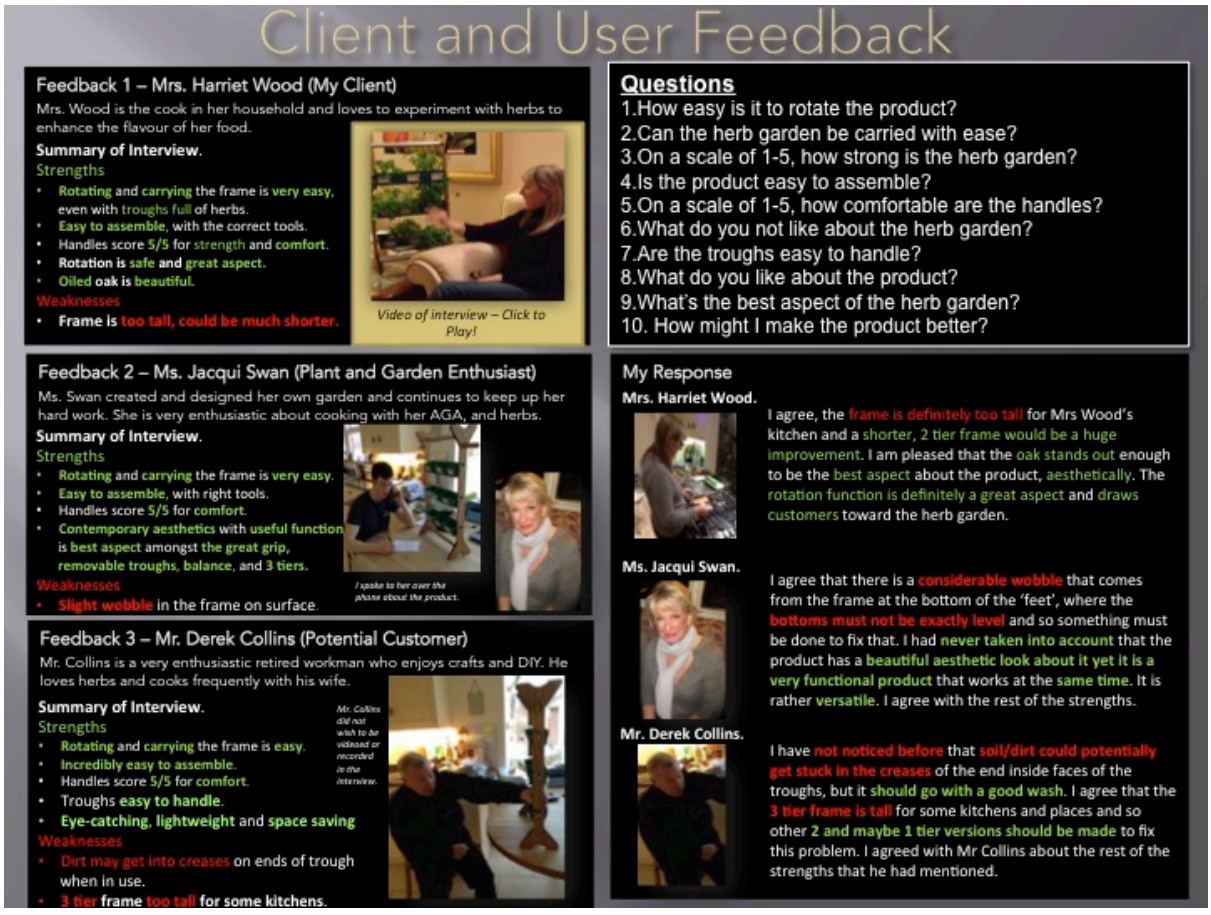
Use a range of pre-prepared handouts that include a photo of a suitable product and a simple five-point specification. Working in pair's student's practice writing an evaluation against each point then swapping and evaluating each other's work. (This could be combined with the Product Analysis task above) Make sure the products chosen are available to handle in the classroom/workshop such as hole punches, staplers, binders, G cramp etc…

De Bono's thinking hats

As a variation on the thinking hats exercise *(*http://www.debonoforschools.com*)* use each 'hat' to represent an area of the specification such as Function, Ergonomics, Manufacturing, Materials etc. Pupils can work in groups to evaluate a range of products.

Independent Evaluation

Example page



Students should arrange an evaluation of their product by **at least two people** suitably qualified to give opinion and comment - one of these should be their client. Allowing these people to have direct contact with the product is essential for an effective evaluation. **Evidence** of this testing must again be provided in the form of photographs and/or video clips and could also include headed/signed letters and audio clips.

A **summary** of the key findings is preferable to a complete written transcript. This can also allow the student to highlight key strengths and weaknesses. A questionnaire could be used at this stage, not as the sole source of feedback but rather to support and expand upon the range of face-to-face feedback obtained. The emphasis is on the **quality** of feedback obtained rather than the quantity.

Responding to the independent feedback is crucial for a high mark. It is important that students remain positive and openly consider the suggestions made by others. This may include proposing suitable modifications.

Common student misconceptions: *Faked feedback, no evidence of contact with a real person, evaluation by email, having only friends evaluate their product, inappropriate questionnaires, written transcripts of entire interviews, no response to the feedback, an assumption that their product is perfect*

Suggested Activities

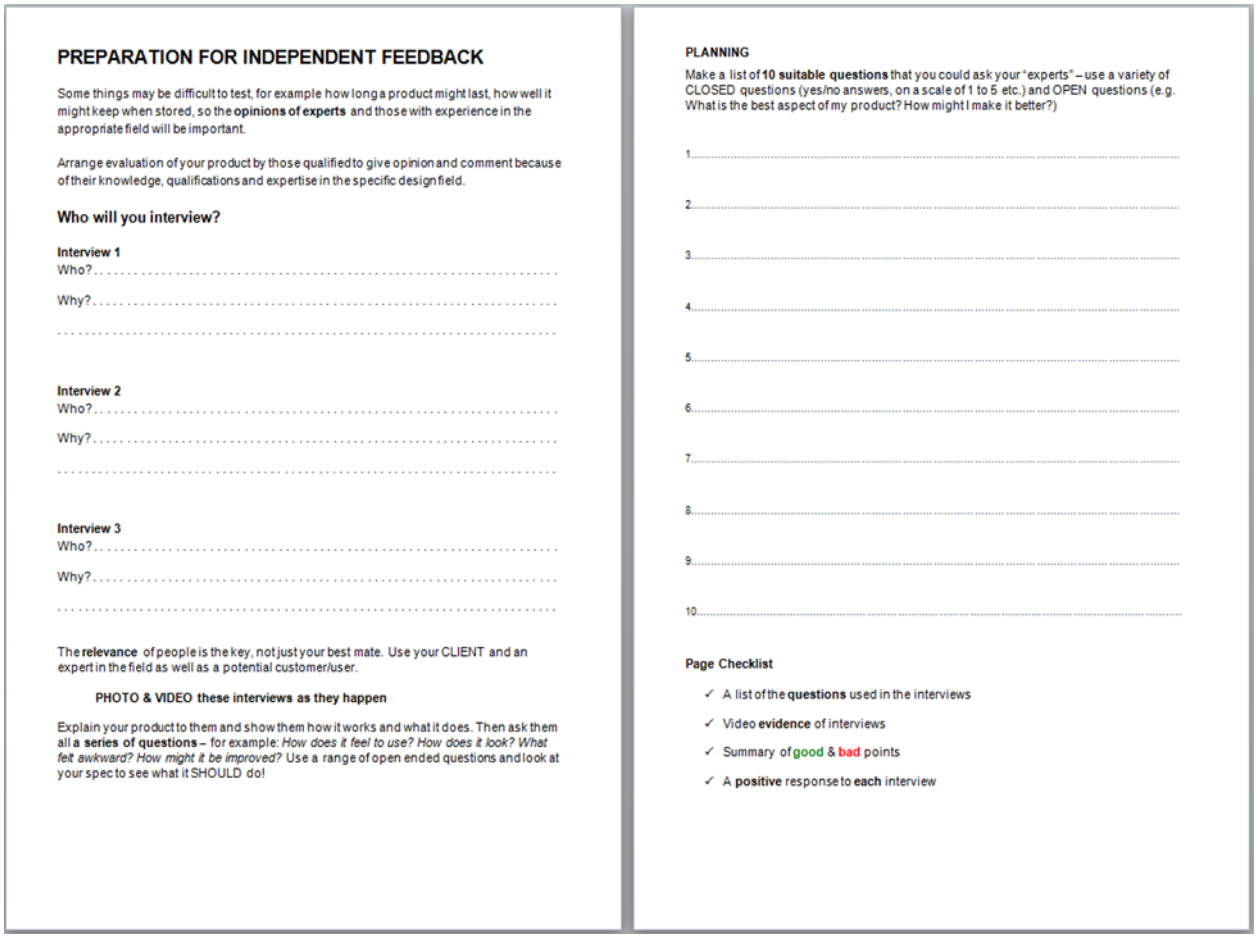
Practice interviews

Students will need to be confident when conducting their interviews. Working in groups of three (interviewer, interviewee and cameraman/ photographer) get them to practice on each other. This does not have be design related; it could be focused on hobbies. There are many styles of interview available on YouTube to help introduce and prepare them.

Preparation

Get your students to write 10 appropriate questions that could be used during their interviews. These can be checked in advance by working in small groups.
http://predictableprofits.com/the-10-most-powerful-questions-to-ask-when-developing-a-new-product-or-service/ is a good site to help them.

A handout similar to this one can be used to as a homework assignment during the making to help them prepare for this page:



PREPARATION FOR INDEPENDENT FEEDBACK

Some things may be difficult to test, for example how long a product might last, how well it might keep when stored, so the **opinions of experts** and those with experience in the appropriate field will be important.

Arrange evaluation of your product by those qualified to give opinion and comment because of their knowledge, qualifications and expertise in the specific design field.

Who will you interview?

Interview 1
Who?.....
Why?.....
.....

Interview 2
Who?.....
Why?.....
.....

Interview 3
Who?.....
Why?.....
.....

The **relevance** of people is the key, not just your best mate. Use your CLIENT and an expert in the field as well as a potential customer/user.

PHOTO & VIDEO these interviews as they happen

Explain your product to them and show them how it works and what it does. Then ask them all a **series of questions** – for example: *How does it feel to use? How does it look? What felt awkward? How might it be improved?* Use a range of open ended questions and look at your spec to see what it SHOULD do!

PLANNING

Make a list of **10 suitable questions** that you could ask your "experts" – use a variety of CLOSED questions (yes/no answers, on a scale of 1 to 5 etc.) and OPEN questions (e.g. What is the best aspect of my product? How might I make it better?)

1.....
2.....
3.....
4.....
5.....
6.....
7.....
8.....
9.....
10.....

Page Checklist

- ✓ A list of the **questions** used in the interviews
- ✓ Video **evidence** of interviews
- ✓ Summary of good & bad points
- ✓ A **positive** response to **each** interview

Student Worksheet 2

Responding positively to feedback

This skill is best developed throughout the course. AS unit F522 requires a substantial amount of interactive dialogue and peer review throughout and Unit F521 makes use of group feedback before development.

An excellent resource to help students prepare can be found at Smashing Magazine - http://www.smashingmagazine.com/2009/10/01/how-to-respond-effectively-to-design-criticism/

Strengths and Weaknesses

Example page:

Based upon their testing, evaluation and user feedback students should now be in a position to summarise their products **strengths** and **weaknesses**. If these have been highlighted throughout then this should be easier to achieve. **Quantifying** a range of important strengths/weaknesses is more important than listing every single one. Consideration of **weaknesses** should be in order of **seriousness**, as this can help students to focus on any improvements required.

Suggested improvements are best presented in the form of **high quality annotated sketches** but could also include CAD models. A selection of **specific** improvements presented and discussed in detail are preferable to a long list of superficial improvements. It should be clear which specific weakness they are addressing. Discussing the **implications** of each weakness should also be encouraged. Note that any improvements needed to make the product more suitable for batch production should be in section 7.

Common student misconceptions: *Lists with no explanations, a reluctance to identify weaknesses, superficial improvements, quantity over quality, improvements that do not address the important weaknesses*

Suggested Activities

Match up

Using prepared cards get students to match the strength to the description and justification. For example matching *"Lightweight"* to *"due to the use of aluminium tubing"* to *"this makes it very easy for the user to move it around in the office"* helps them to see the structure of a good comment. This could be made more difficult by getting students to work in teams to write them first then break them up and swap over and complete each other strengths/weaknesses.

Next Step

Using edited examples of work from previous years (just the testing and interview pages) get the students to identify the strengths and weaknesses of a variety of products. Then check them against the actual ones.

Sketching improvements practice

This skill should be developed throughout the entire A level course but students can practice by tackling quick re-design tasks as starters or homework assignments. You can vary the level of difficulty by how much is given to them. Ranging from them choosing a product to a prepared sheet with a product and three weaknesses to address listed for them.

Preparation/homework assignment

A sheet similar to the one below can be used to get students thinking about potential improvements during their testing:

Look back at your **EVALUATION** think carefully about your product and identify **the FOUR MOST SERIOUS WEAKNESSES**.
Focus on things that can be **IMPROVED** by altering the **DESIGN**.
****DON'T focus on mistakes made during the making! (such as poorly chiseled joints, wonky fixings, poor quality finish etc)**

Problem ..... **Why is this a problem?** ..... **Solution** .... **Show me** *(use annotated sketches)*	**Problem** ..... **Why is this a problem?** ..... **Solution** .... **Show me** *(use annotated sketches)*
Problem ..... **Why is this a problem?** ..... **Solution** .... **Show me** *(use annotated sketches)*	**Problem** ..... **Why is this a problem?** ..... **Solution** .... **Show me** *(use annotated sketches)*

Student Worksheet 3

Implications

Provide students with example products/improvements and ask them to discuss the implications of each change. This can be left open or guided with questions such as “Explain how this will make the production time longer” or “How will this make the product more expensive?”

Preparation/Resources

Familiarisation with the following work can help teachers and students prepare for this section:

Books

P80-82 & P140-144 *'OCR Design & Technology for A level'* by J Grundy, D Hallam, M Hopkinson, S McCarthy

P115-119 *'Advanced Design and Technology 3rd edition'* by E Norman, J Cubitt

BSI Education Websitehttp://www.bsieducation.org/Education/default.php www.bsieducation.org/Education/default.php

iTunes U – Consumer Product Testing

Video:https://itunes.apple.com/gb/podcast/consumer-product-testing/id380225312?i=84481174&mt=2

Transcript: https://itunes.apple.com/gb/podcast/transcript-consumer-product/id380225312?i=86355113&mt=2

iTunes U – Testing Standards

Video:https://itunes.apple.com/gb/podcast/testing-standards/id380225318?i=84481188&mt=2

Transcript:https://itunes.apple.com/gb/podcast/transcript-testing-standards/id380225318?i=86365767&mt=2

Interview Questions

http://predictableprofits.com/the-10-most-powerful-questions-to-ask-when-developing-a-new-product-or-service/

Previous students' work / examples from the Centre or from those provided as part of OCR support for this Specification can be analysed/marked and used for guidance.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