DESIGN & TECHNOLOGY

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**Overview**

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**Subject Focus**

**Evolution of Product Design** – this links directly to the KS4 curriculum for Design Technology as students need to have an understanding of 20th century design and its’ influences. An understanding of design from the past and present is also required at KS3 to broaden their understanding and enable students to design products that are innovative.

**Using Customer Profiles to generate Design Criteria** – this is required at both KS3 and KS4. Students are expected to use ‘research and exploration’ to define the needs of specific customers so they can then use this to design products that meet set criteria based on the target customer and are fit for use.

**Identified Key Character Qualities**

**Curiosity from the Intellectual Domain** – using investigation and inquisitive approach to reflect on the design of products over time and how/why this changes.

**Tolerance from the Moral Domain** – emphasising the need for a designer to identify the needs of a target customer and working within the constraints this places on the creative mind of a designer.

**Character Focus**

**Curiosity** – the evolution of Product Design requires students to naturally be inquisitive about products from the past in order to identify what changes about products and the factors that drive this change. The need to identify the needs of target customers’ needs also requires a curious and inquisitive approach to define the needs and wants of a customer who might have very different needs from the designer’s own. The process behind the sequence of lessons is for students to have time to stop and look and reflect on what products are like now and how they’ve developed from past versions; notice and gain awareness of different target customers’ needs and the implications of not fulfilling these needs as a responsible designer; look at products in detail by using analytical skills and combining this with our understanding of a customer’s needs and reflecting on the success of a product by comparing the function with fulfilling a need of a customer; listen to and act on the needs of a customer by working and remaining within the constraints of set design criteria to make deliberate choices about the design of a new product; caterpillar – the final two lessons bring the curiosity of products new and old, and the curiosity of knowledge of a customer together by testing the student’s ability to recognize the needs of a product,
know and accept the constraints of design criteria and therefore design in a controlled and responsible manner.

**Tolerance** – this aspect of character education is introduced during lesson 2 and is combined with demonstrating a tolerant approach to other groups within society or our world who are different from ourselves and therefore being able to use this understanding of others to design appropriately and with consideration for their needs. The customer profile lesson gives students the opportunity to stop and consider who the different types of customers are in the world – how we define groups of people to fit within a target market and why people fit into these groups. It is an objective for students to understand people have different needs and that a designer has a responsibility to notice the needs in order to design in a responsible way. They will also look at how and what we decide to consider about groups of people in order to design for them successfully as a target customer; they will then look at a specific target customer in detail and define what their needs are as a consumer; the design activities are geared towards giving the opportunity for students to experience designing within constraints and why it is important for a designer to place higher priority on the design criteria which defines the product needs and a customers’ needs as opposed to the designer’s own personal choices and preferences. It is about looking at the design criteria and applying this to a creative and inspirational design strategy that helps you to think big then scale it down to a realistic product that meets the needs of a consumer. They will use the design process to think creatively and share ideas together; listen to each other and make deliberate design decisions and judgments (accepting others’ opinions that might differ from their own) to ensure as designers they are acting responsibly and designing with the function and customer needs as their priority. The final design challenge will test their tolerance of working within a fickle and fast changing design environment and accepting and responding to demands on changes to design criteria to ensure the needs of the customer are still met. This is a personal development (caterpillar) activity that tests their own personal level of tolerance towards change being enforced by an outside influence and still working within the constraint placed on them by that outside influence. They discuss the moral aspect of their personal response and also compare this to the moral responsibility of a designer to design within constraints and meet the needs of their target customer.

| Differentiation | With activities that involve a lot of technical language the TA spent time using a highlighter to pick out key words and phrases to help students apply the language. They also focused in on less (for example, the human factors) and encouraged the students to question more about 2-3 aspects of the product rather than all the aspects we looked at as a whole class. For more able students, prompts were given to find information |
more independently and to make links with other aspects of subject knowledge. For example, they looked at the battery size and performance of the battery for a Roberts Radio but then compared this to environmental needs as well as the function of the product. The aspects of products or target customers were linked and brought together by more able students rather than looking at in isolation.

I also used teacher modelling where possible with guided groups to demonstrate approaches to work. For example, using the crazy sensible strategy with a small group of less able students timing me as I designed using the words they had generated and talking through my thought processes at the same time.

Useful resources such as a dictionary for activities with technical language and Thesaurus for activities demanding use of more creative language also helped.

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<td>Single tasks from the lessons could be used alone as ‘stand alone’ tasks. The sequence of 5 lessons follows the process students experience when beginning a design brief and the five lessons are designed to help them develop the skills to define their product focus, target customer and design criteria. However these could be used to focus in on specific aspects of the design process such as product analysis. For example the third lesson which focuses in on the design and make of a specific product could be used for one material area within Design Technology to look at products specific to their material focus e.g. moving toys; exotic fruits; performance sportswear. The length of activities can be varied depending on the level of depth required by students. The activities for lesson one based on the evolution of product design can be delivered with pace by looking at the aspects of change in the products within groups or it could be done as a more detailed activity in which students work eventually on a final study of one product in greater detail.</td>
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<td><strong>Attainment</strong> – the activities enabled a personal approach to tasks such as selecting a customer to produce a profile for and selecting which product to analyse in more detail (lesson 3). The handing over of choice to students gave them a sense of ownership with their work and they were therefore more focused and engaged for longer. The use of a character focus alongside the focus on subject knowledge also engaged them. The fact that their personal response/approach to tasks was also an objective of the lesson gave the tasks more meaning to the students. They were more self-aware of their performance as well as what they were learning and the work being carried out. The quality of the designs in the Design Challenge of lesson 5 were probably of a slightly lower standard of presentation than the students involved usually demonstrate however their ability to listen, think and act quickly to design instructions has improved so the process of this activity has developed their design ability.</td>
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**Behaviour** – the group I delivered the sequence of lessons to are characterized as a chatty and very verbal group. They are overall a capable group but often chattiness leads to missed information from some and this sometimes has an impact on their achievement. The balance of activities as verbal discussions within groups and then sharing with the group seemed to balance the chattiness better and led to them being on task for longer once doing individual work. The opportunity to handle the products for activity three also led to a more focused attitude towards product analysis than if they were working from a 2D image/photograph.

**Things That Worked Well**

Students were engaged in the activities across the five lessons and had a positive response to the fact we were also looking at character qualities as well as developing subject knowledge. I made them aware this was as much the focus of the lessons as the subject knowledge. This was a good strategy to use as they were self-aware, especially for the lessons focusing on curiosity.

**Things That Might Be Improved**

The first activity would benefit from students being given the opportunity to focus for longer on the design of the products from the past rather than launching so quickly into comparing with the contemporary design of the same product. This would help them to identify more from a user point of view the plus and minus points of the design of these products. It would also give them further time and opportunity to delve further into questioning of how the early design of some products came about and how they functioned, as well as how the user would have used them and whether some customers would have struggled to use the products. This would give students the opportunity to demonstrate their level of curiosity with questioning and further independent research. There is also a lot of technical language linked to human factors in design which the less able students struggled to apply in their own responses. They understood each of the human factors but needed more opportunity to reflect on them and therefore be able to apply them appropriately. When students were doing the design task in the final activity, during the part when the design criteria keeps suddenly changing without warning, their physical and verbal responses were surprising – and funny. It would be useful for them to stop during this part of the activity and reflect on how they feel at that moment. I got them to reflect at the end of the design task and many of them hadn’t realized the nature of their responses changed and developed throughout the task. A number of students reacted quite angrily to the changes at first and refused to adapt their designs in response to the change but as the changes kept being announced they became much more tolerant of the change, got used to it, were ready for new changes being announced and responded more calmly towards the changes. Luckily myself and a TA observed these reactions and changes in student responses but it would be useful them to recognize this change in themselves as it occurs so they can reflect on the benefit of being more tolerant and the consequence of being less tolerant.
### Lessons

#### Subject Focus

**Lesson One:**
- To **question** why the design of familiar products has changed over time
- To **investigate** what causes change to the way products are made, look and function
- To **ask** and **debate** if these changes are necessary – who or what benefits from evolution and new development of products?

**Lesson Two:**
- **Consider** and decide on what a designer needs to consider about a target market (customer)
- **Understand** why they need to consider the needs of a target market to be a successful designer
- **Apply** the criteria for profiling a customer to a specific target market

**Lesson Three:**
- To **investigate** the function, aesthetics and accessibility of a product
- To **reflect** on what could be made better to improve the function, aesthetics, accessibility and appeal of a product
- To **consider** the next steps of an everyday product to appeal to a specific target market need

**Lesson Four:**
- **Identify** what skills and personal qualities **you** can bring to a task by working like a designer
- **Experience** the difference between designing with limited criteria and control, and designing with **more** specific criteria control
- **Think** ‘out of the box’ - make what might seem a crazy idea into an idea that can work for a target customer

**Lesson Five:**
- **Identify** what skills and personal qualities **you** can bring to a task by working like a designer
- See how **applying** our **individual** skills and qualities can help achieve a **group** goal
- **Think** ‘out of the box’ - make what might seem a crazy idea into an idea that can work and does meet specific design criteria.

#### Character Focus

**Lesson One:**
- **STOP** – **ABILITY TO PAUSE BEFORE (MORAL) CHOICES ARE MADE**
- The focus of the lesson is on the evolution of product design. The main theme is to identify what triggers changes to the design of a product – customer demand, technological change, cultural/religious issues, social and/or economic situations, environmental issues. Students will look at products from the 20th century and discuss and decide why the change occurs and extend this by deciding if the change is of value. The purpose is to stimulate curiosity about the world we live in, how it has changed over time and how product design has moved alongside a changing world.

**Lesson Two:**
- **NOTICE** – **AWARENESS OF SITUATIONS WITH (MORAL) IMPLICATIONS.**
- The context of this activity is to engage students in understanding that designers have to work towards the constraints of their target market and that specific customers have needs that are associated with them. This is to stimulate their curiosity towards other people in society other than self and to show tolerance of other groups’ needs when designing. This also introduces the concept of moral responsibility in the design world in ensuring the accessibility of products to the different groups within society.

**Lesson Three:**
- **LOOK** – **UNDERSTANDING OF HOW EMOTIONS CAN HELP US TO CHOOSE WELL**
- The focus of this activity is on Product Analysis and how this helps designers to improve and refine existing products. The activities are based on whole class
discussion and sharing of ideas, and students working in small groups. They need to make decisions on why a designer made decisions about a product and this will test their resilience and patience when listening to and accepting opinions and ideas of others in the group.

**Lesson Four:**  
**LISTEN - USING REASON TO MAKE DELIBERATE (MORAL) CHOICES**  
The focus of a design thinking strategy is the main focus for this activity. This design strategy requires students to think creatively and imaginatively yet also in a realistic manner to achieve a workable outcome. It is the ability to take an ‘out of the box’ idea, develop it and refine it into a product that would suit their chosen target market.

**Lesson Five:**  
**CATERPILLAR – UNDERSTANDING OF PERSONAL (MORAL) DEVELOPMENT**  
Students will complete the sequence with the creation of design ideas from a simple set brief but within the constraints of the needs of their chosen customer. The design criteria is an expectation in the annotation of ideas and it is this which is a written prompt to show how deeply students have absorbed and acted on the needs of their user. By designing products that are appropriate for their chosen user they will have succeeded in working within the tolerance of the design requirements of their customer. They will hopefully will have demonstrated a tolerant attitude towards the changing needs of a customer, designing to suit the needs of another citizen rather than designing for their own self and own preferences.

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**Lesson Activities**

**Lesson One:**  
**Starter activity** – Use the A3 copy of the slide with images of everyday products from the past & identify what the products are and what is similar and what has changed.

Using the images of swimwear, the camera, domestic kettle and the telephone, ask students in small groups to focus on one of the products from the images and to identify how the design of the basic product has changed over time. Decide what has changed over time and discuss/reason/debate why the change has occurred – who or what made the change happen?

Using the A3 sheet with the collection of products listed – ask students to read together the human factors that can trigger the change in the design of products. Students to work individually completing information on what has changed, what aspects of the product remain the same and to decide which of the human factors has triggered this change. Students to extend this response by considering whether the change is for the better.

Gather together the information collected and recorded. As a whole class tally the results for the response to whether the change of each of the products was for the better or was it unnecessary? Recap what has changed and what remains the same. Discuss the reasons for the changed linking this to the human factors introduced in the main activity.

*The intended impact of this lesson from a subject knowledge point of view is to encourage students to realize that products change for a whole range of reasons, some are a natural progression as technology and materials change and develop, some are driven by human needs and some are*
driven by pressure of marketing which can be seen as change for change sake rather than change. Students are encouraged to use their curiosity visually and through questioning and reasoning with others to collect information that will enable them to make informed decisions about the evolution of different products.

**Lesson Two:**
Students to work in small groups completing an A3 ‘Who Am I?’ sheet with an image of one target customer. Students to record quick ideas about their customer using the prompts on the Who Am I? resource.
Lay out the completed ‘Who Am I?’ sheets in the class room and show the target customers on the whiteboard. Ask the students to match up the images of the target customer with the sheet to which they think it belongs. Ask students to give reasons for pairing the customers with the completed ‘Who Am I?’ sheets.

Teacher to present the group with a sample customer. This person might be someone with whom they are or are not familiar. Students to be presented with the challenge of deciding on 6 questions they can ask the customer in order to gain useful information that would help them as a designer to design appropriately to the customer’s needs.

Record student responses using slide 7 (this can be printed beforehand for students to record ideas). Share the suggested questions and decide as a class if they are useful, inquisitive questions that will provide informative responses from a customer. Use the slide with suggested ideas to see if students came up with similar ideas and to further question if these would be useful things for a designer to know about their customer before they start to design for them.

If using the customer on the PowerPoint – go through factual information about the person given on the slide. Are the questions generated as a class relevant to this customer?

Students to then select a target market to focus on and whom they will find interesting to design for (this will be used at a later stage for a design task). Students to then complete the profile format. They can use the headings provided and should be encouraged to add their own to show deeper consideration about a target group.

Students need a post it note to record who they have decided to profile. Using the list on the PowerPoint (Function, Cost, Cultural/religious beliefs, Materials, Size/Dimensions, Aesthetics – appearance, Quality, Safety, Environmental Issues) students to question and decide the key criteria their customer would consider as a consumer buying a product. Swap notes with a partner and comment on partner ideas.

The intended impact of this lesson from a subject knowledge
point of view is to help students identify that different people fit into different categories of 'target customer' and that products are designed specifically for a target market to fulfil either customer need and demand or to make profit. It is also designed to enable students to produce an appropriate profile of a target market that they will design for. It is also designed to help them understand and be able to identify that people have differing needs and that this places constraints on a designer. It will encourage students to find out about other groups in society different from themselves (Curiosity) and to some extent offer the opportunity to demonstrate tolerance of others' needs by accepting the needs of others and being willing to design with the needs of others in mind.

Lesson Three:
Working in small groups students will have one product to handle, question each other about and investigate. Use the 5 quick questions on slide 3 to structure the ideas and conversation.

Small groups to feedback to the whole class, to introduce their product stating what the function is, materials used, design features, etc. and give their agreed group opinion on who the product appeals to and who would struggle to use the product with justifications for each. Invite the whole class to either say why they agree or to question the points made by each of the smaller groups.

Teacher to have a collection of products (photographs if not actual products) to show the class for handling and analysis. Position them around the room alongside the A3 response sheet for Main Task 1. Model responses to a product based on the discussion from the starter.
Pupils to spend 4-5 minutes with each of the products and record responses on the A3 sheet next to the product before being prompted to move onto the next product.

Individual task – Pupils to choose just one of the sample products to focus on in more detail. The teacher to model responses for some of the criteria on Main Task 2. Using the A3 Main Task 2 sheet, and by reading and reflecting on the group responses to their chosen product, pupils to record own more detailed responses and incorporate a design sketch for ways to develop the product, move it forward, make it more fit for the intended purpose or user. Using slides 9-10 students can start to think about the actual criteria that controlled the designer’s actions whilst designing the product. Slide 10 can be used for the teacher to model how criteria could be worded for examples of the criteria used in the analysis from task 2. Using this example, students can plan the wording of 3 criteria points for the product they have analysed.

Students to look at slides 9-11 and be given 5 minutes quiet thinking time to consider responses to the 5 questions. Working through each of the 5 questions on slide 11, invite individual students to give a verbal response to each of the 5 questions. The aim is to comment on the product with reflection and opinion moving towards fact with what they think was the criteria for designing. Encourage through questioning the criteria that was either essential or desirable in relation to the target market and the successful function of the
In the lessons so far, students have been able to demonstrate the level of their curiosity through questioning, scanning information, discussing and reasoning with others. These activities are designed to give students the chance for physical curiosity through the use of handling and testing products and watching how they function. By witnessing how products work and seeing their scale, materials and function, students can make sharper comparisons to modern day products as they have a personal experience of the product to draw on. The ability to handle the products might generate further questioning and curiosity of products because the experience of handling might raise questions that simply looking at an image would not necessarily inspire. From a subject point of view, this activity enables students to know and apply the general criteria for analyzing existing products in a way to inform a designer and to encourage the ability to develop and improve existing products.

Lesson Four:
‘Redesign the biro’ task from slide 2 – read the instructions and start sketching ideas from the instructions given. Use A4 paper and request quick thinking pencil sketches.

Using slide 3 to structure discussion, ask students to feedback on their initial response to the task and how successfully they felt they could proceed with the task with basic instruction.

Students to use the image sheet on desks or displayed on the whiteboard to record descriptive words that relate to the objects in the photographs they can see – consider colour, shape, texture, sound, pattern.

Swap sheets with a partner and add to their ideas. Students to give feedback with the teacher recording the words for use at the start of the first design task.

Teacher demonstration of using ‘Crazy Sensible’ as a design thinking tool. This can either be shown on the whiteboard or presented ‘live’ with the teacher drawing a quick idea in response to the language recorded and highlighted on the PPT slide.

Students then to complete the same task in timed conditions to keep it pacy and quick thinking and to encourage innovative ideas.

Using slide 13, ask students to compare the design strategy just used with the basic design instructions given at the start of the lesson activity. Question which aspects of designing were made easier and what was more challenging. Did they stick to the design words they had selected or did their ideas veer away from them?

Using slide 14, students are to choose 2-3 of the design criteria headings we commonly use and to present their pen design to the group by selling this aspect of the design to the group.
The initial design task is based on a design tool from the Key Stage Three strategy and is designed to help students to think out of the box more easily. It uses language and literacy skills to provide a springboard for creative ideas. Asking students to design a new product sometimes leads to them simply drawing existing products they have already seen or drawing very basic products that lack innovation and originality. By using the descriptive language based strategy, students are inspired to generate ideas that are more imaginative and unusual but that still fulfill the needs of design criteria. Both their tolerance and creativity are tested by students generating and then choosing specific words which their design drawings must be inspired by. The constraints of design criteria can be frustrating for some students to work within as they want to follow their own preferences. Their willingness to maintain the details from a basic design criteria (using the descriptive words as the criteria) will be tested. The aim is to also develop their actual drawing design skills and ability to think and sketch quickly what they can see in their mind.

Lesson Five:

Read the instructions on slide 2 and discuss in small groups (ideally 4 students per group) the needs of each of the roles identified. Allocate these roles to each other.

As a whole class read aloud the Design Brief on slide 5. The teacher can use slide 6 to clarify the task ahead and then volunteer students to read each of the Design Criteria to ensure students are clear on the constraints for their design ideas. As a whole class, discuss design possibilities briefly, using the images on slide 8 to inspire thinking.

All students to begin sketching ideas based on the design criteria discussed. Once students have started to generate and sketch their ideas (approximately 10 minutes into the task) use the PowerPoint to announce the changes to the design criteria at different intervals in time. Allow enough time between each new change for this to become a challenge for students and forcing them to have to adapt and sketch different ideas. Slide 14 is the prompt that the final design needs to be ready within 3 minutes so ensure this is given at an appropriate time to enable students to have achieved a mostly if not fully completed idea. The student selected to do the Pitch needs to have begun planning their pitch at least 10 minutes before the final 3 minute warning is announced.

Design Groups to share their pitches and take questions from the teacher/remainder of the class about their final design and the information they have given about the design.

Use the 5 question grid to gather student's individual
responses to the design activity just completed. Give 5 minutes silent thinking time for students to have a personal response that is not overly influenced by their peers. Students to then share responses with the teacher and the class.

This final design based activity is planned to provide the opportunity for students to demonstrate their own personal levels of tolerance towards the needs of others to ensure they are designing a product that fits a need; it is also a task which states the specific criteria students have to remain within so therefore means they must restrain their ideas and ensure they remain within the parameters of the design criteria. Further testing of this ability to think and work within constraints is placed on the students by announcing a series of sudden and very specific changes to the design criteria. This would require students to rethink their ideas, which they might be quite precious towards, and think quickly and creatively to generate updated ideas which still remain within the constraints of the original design criteria as well as meeting the new criteria.

### Notes on Differentiation and Adaptability

**Lesson One:** the human factors information could be quite wordy and technical for less able or younger students. This could have key terms highlighted in different colours or the text broken down and simplified. I gave a homework task to choose one of the human factors to write their own definition for in the lesson previous to the first lesson of the sequence so that we had a ‘word wall’ written in the students’ own language to refer to during this lesson. For higher ability students language linked to the formal elements in design such as form, uniformity, and scale & proportion could be introduced to help students describe and analyse how the design of products has changed over time and how this affects the product’s usability.

**Lesson Two:**

When I delivered this session I was surprised at how much students wanted to simply discuss the life of Malala in more detail. This slowed the activity down but was worthwhile as it linked to the tolerance focus in the later lessons. Some students used her as their choice of target customer to present their customer profile and considered aspects of her as a consumer in further detail than discussed in the lesson. It helped to spend some time mind mapping different types of consumers students could focus on for their own customer profiles to help less able/younger students to choose a less familiar target customer to research independently. Some students have a tendency to go for obvious target customers that are familiar to themselves such as ‘teenager’ or ‘small child’ and the mind-mapping helped some students choose more challenging options.

**Lesson Three:** I intend using this activity with a KS4 Product Design group to help them draft a product analysis for the type of product they want to design for their formal controlled
assessment task and will use Slide 8 as a sheet for each student to annotate with ways to extend the prompts already in the text boxes. The prompts in the boxes suit KS3 and act as reminders for aspects of the products we have already discussed as a group but KS4 could annotate this further by recording specific questions for them to ask themselves about the product focus for their own CAT. The initial task of looking at and handling actual products could have some basic product information for KS3 or less able students to scan and highlight (e.g. technical names of materials used) to aid them with the 5 quick questions task. This information could include further technical information to extend the knowledge and responses of KS4 or more able students.

**Lesson Four:** Images of existing products that are quirky and link to the design task would help less able designers to generate ideas, although you would have to be careful to ensure students do not copy the existing ideas and use them as a springboard for their own creative thinking. I recorded the descriptive language students contributed to the activity on a flipchart so it could be easily referred back to once students moved onto the individual design task. Thesaurus available for more able students enabled them to produce more unusual combinations of words and phrases which then led them to more creative choices for choosing keywords to design with in the ‘Redesign a pen’ task. I have kept examples of some of the designs students generated during this task so that when I use the Crazy Sensible activity again there is a visual source to inspire students.

**Lesson Five:** The use of a writing frame for students to structure their pitch gives them focus when writing the pitch and more confidence when speaking in front of the group. Students can use this as the basis of what they need to say but could extend their pitch by linking it back to the human factors from lesson one of the sequence.

**Other Points Worth Noting**

To move easily and swiftly from individual/paired/group tasks, it is advisable to have the desks positioned in groups. I had a layout of six group tables with approximately 4 students around each table so the class was organized to do short tasks as groups and to share resources such as products to handle. This layout was useful when I needed students to view a range of products as each group of students rotated around each of the grouped tables in an orderly manner.

Lesson 3 which is focused on product analysis is more effective when students have actual products to handle. This enabled them to explore the products together and led to more inquisitive questions from them. I had the products that I used on the PowerPoint but other products could be used for this task. This could also be themed – the Food teacher in our department is going to use this task but focus the theme on cooking equipment used in different cultures so she will use
these objects instead of the ones I have used on the PowerPoint.

**Extended Learning Tasks:**

In preparation for lesson 1 students choose one of the human factors. Read the definition stated on the PowerPoint for lesson 1 and then rewrite their own definition of the term – aim to give an example.

Following from lesson 2 – choose one product from home to apply one of the human factors to e.g. how have anthropometrics affected the design of a dining room chair.

Following on from lesson 3 – give time to complete an individual customer profile of one specific target market.

Following on from lesson 4 – collect images of chairs with quirky designs (you could give the theme from the design challenge for lesson 5 if students are less able designers so they have a visual resource to work from in lesson 5. However to challenge students more, they could look at a broader range of themes as part of the extended learning task so the stated theme in the design challenge places a design constraint on them and tests their tolerance to change!)