# Topic area 1 – Identifying requirements

# Exploring the needs, wants and interests of primary users and wider stakeholders

# Introduction

## Overview

Delivery guides are designed to represent a body of knowledge about teaching a particular topic and contain:

* Curriculum Content: A clear outline of the content covered by the delivery guide;
* Thinking Conceptually: Expert guidance on the key concepts involved, common difficulties students may have, approaches to teaching that can help students understand these concepts and how this topic links conceptually to other areas of the subject;
* Thinking Contextually: A range of suggested teaching activities using a variety of themes so that different activities can be selected which best suit particular classes, learning styles or teaching approaches.

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# Curriculum Content

## Overview

*EXAM CONTENT*

1.2 Considerations in relation to user interaction with design solutions, including: The impact of a solution on a user’s lifestyle

1. The ease of use and inclusivity of design solutions
2. Ergonomic considerations and anthropometric data to support ease of use
3. Aesthetic considerations

*NEA CONTENT*

1. Investigate the needs, wants and interests of primary users and other stakeholders to identify and understand the requirements for designing, through collecting, analysing and presenting their findings from primary and secondary data

# Thinking Conceptually

## Overview

### General approaches:

To achieve the level of understanding required to successfully propose improved design solutions to solve a problem, the learner needs to have taken an analytical and enquiring approach to the process of establishing how successful (or not) a design solution already is. In order to be best equipped for this task, it will be important to provide learners with the tools and questions that prevent them from establishing conclusions without truly observing and critiquing what they see, hear, smell, touch and taste.

In order to understand where a design solution impacts on a user’s lifestyle, the learner will need to be able to observe a real-life experience of the solution in use, either through role play, but ideally as a first-hand experience of the actual activity. This may be conducted through an interview, and could be conducted individually or in groups, within the classroom or away from it.

When considering ease of use and inclusivity, the design solution should be observed and used by a range of different people, varied perhaps by age or ability. An inclusive product such as an adjustable bicycle may potentially cater better for individuals with more favourable anthropometric data than others. Learners will need to observe the same tasks being completed by each different people in the target group.

With anthropometric measurements, it is important to recognise that data has a range, and therefore some iteration will need to take place in any subsequent designing where comfort might be affected by the design solution being tailored towards the top or bottom end of the measurement range.

Ergonomic considerations are much more tactile in nature, and subsequently require design solutions to be handled or experienced by the user and the potentially the learner also. The consideration of how comfortable a design solution is in use means that data gathered must be rich, with open questions being answered, and therefore soundbites or videos would be preferential to capture this information. As with all design solutions, there should be a consideration where applicable for the ergonomic factors to be explored over different time periods. I.e. a design solution might become more or less comfortable over a longer period of use.

Where aesthetic considerations are considered, there is an opportunity for the learner to be creative in their approach. Whilst aesthetics will provide a chance for the learner to use open and closed questions to establish opinion about aesthetics, the learner can also use physical objects, handling collections, sketches, photographs and other media to support this area of exploration.

### Common misconceptions or difficulties learners may have:

Students often believe that secondary research will sufficiently inform good design decisions. In reality this is false, as the source of secondary information can often be manipulated by the source to give a skewed presentation of information. For example, using a retailer to identify breadth of design solutions will be influenced by that retailer’s choice of product to include in their offer. A retailer of kitchen kettles will inherently have discarded certain models from its range because of a reason that is not obvious to the learner.

Primary research from real people will invariably be rich, more diverse, and present less predictable outcomes than that of secondary research. The specific consumer purchasing decisions of a group of users will provide data on current market trends for that group, rather than identifying a retailer the group shop at and looking at the entire product range available to that group. There is no specific number of research activities required to establish sufficient information for design. One rich piece of research would be equally useful compared to seven or eight smaller pieces of focused research. Likewise, research to inform design should not be a specific phase in the project, I.e. part of a linear journey. Research can be conducted to support decision making at any point in the project, and is often more focused once specific ideas have evolved.

The important skill that learners need to learn is that they need a full understanding of what is going on in the design context, and therefore what questions need to be answered before a summarising judgement of the design direction is created and the learner first commences the iterative designing and development of the solution.

### Conceptual links to other areas of the specification – useful ways to approach this topic to set learners up for topics later in the course:

By exploring tactile experiences of the stakeholders, which is a very User Centred Design approach, including their ergonomic, inclusive, anthropometric and aesthetic preferences, the learners are practicing and refining their ability to enquire how current design solutions perform. The observational approach taken by learners can be employed during the iterative design phase of the project, where models, prototypes and even sketches and mathematical models can be tested, critiqued and reflected upon in the same manner. Learners who have established good and bad ergonomic factors for an existing solution, can apply the same rigorous test to a sketch model or prototype, and create an opportunity for others, such as the user, to engage in the design process. Though the design solution might be relatively rough and lacking functionality at points in the project, careful questioning can be used to establish successes and failures in the development process.

Once final manufactured design solutions have been achieved, the learner can again repeat these rigorous observations of the user conducting the task to hand in context, and use measures or a critique of the responses of the users as a guide to the success or failure of their finished work.

Broader areas of design development and evolution of solutions could be taught using the learning of this sub section, to engage learners in critiquing the development of existing solutions from a single manufacturer. This could be in the form of a handling collection of evolving design solutions.

# Thinking Contextually

## Overview

For learners to grasp the real approaches designers take in this critical stage in the design process, they will need to be facilitated with opportunities to observe and gather unbiased information. A handling collection of design solutions, perhaps from different manufacturers or tackling the context in different ways would be ideal as a hands-on lesson activity. For example, purchasing the hand held controllers from the past 8 generations of games consoles as a handling collection, in order to allow learners to critique ergonomic design, changes in anthropometric data use, and to observe each being used, would be a rich and dynamic activity that would help learners to consider how a future design solution might need to evolve. Where this subsection is co-taught or reviewed following learning about current and future technology, for example, the learner will have a sufficient number of identified problems and some tools to commence designing and iterating through sketch modelling.

Where access to users or other stakeholders is limited, a class would benefit from the teacher inviting in external people to be the real user. For example, to tackle any design task centred around disability, a visiting speaker who can be interviewed and observed in context would be the only genuine method of gathering information that explores their lifestyle, how inclusive what they do or use currently is, the tactile and measurable nature or both ergonomic and anthropometric data, and the aesthetic considerations that they have made. If the teacher organises a follow up meeting, creating an opportunity for the user to return to handle and critiques the solutions that developed from the first encounter, the learners would be experiencing an approach common in industry. The timescales between research and solution could be varied in the learning of this topic, to help learners experience different pressures within design, but for the NEA, learners will need to have specific dates to which they need to work to.

In interviewing a user, the learner might establish that the solution presents a number of perceived problems, to which the user might also be able to suggest solutions. Though this might seem a viable and useful method, it should be avoided. This is because the user may present their concerns from the perspective of someone who cannot see the bigger picture of what might actually be the issue. For example, a person cutting their dogs hair with clippers might complain of the mess made in their bathroom, and suggest that the solution would be a device that the hair falls into or catches through suction. But an independent observer might question why the dog has its hair cut inside the house, which might be perhaps due to the need for a mains plug socket for the clippers currently in use, to which the solution would be to design a solution to allow the dog to have its hair cut outside by perhaps an outdoor waterproof socket, or suitably charged wireless clipper device.

Observation as part of a lesson, conducted by the learner, needs to be completely unbiased to the task that they are observing, and merely capture factual observations of what is being seen by the learner. I.e. The user brings the dog into the bathroom, the dog is distressed, the user plugs the clippers into the socket and commences clipping, etc. The more detail gathered in the observation, the richer the information will be to reflect upon. This can also provide the chance for learners to identify specific criteria for the next design solution, by using specific actions the user took as a basis to design for.

To observe an inclusive solution, it is important that multiple users are seen and analysed. For example, the gathering of a chopping board from a cupboard, the collection of the fruit and knife to be used, the action or cutting the fruit and removing the waste, the collating of the fruit into a dish to make a fruit salad, and the subsequent cleaning down of the work area, are all tasks that each user could carry out in order. Without instructions from the learner beyond these simple steps as a list, the different users could in turn conduct the task, and the learner could note or record the unbiased observations of what they see. Where the design solution is a product that has a short time of use, this should be adhered to in critiquing the ergonomics, but where design solutions will be used over a longer time span, this will need to be critiqued to inform subsequent high quality research.

Following the observations, the learner might consider asking simple questions such as “Was any of that hard or uncomfortable for you?”, or “How could you have done that more efficiently?”. These open-ended questions recorded as a soundbite or video would provide suitable in-depth and rich research from which issues could be identified, and result in areas for the learner to explore through design. If a specific user group has been identified, anthropometric data can be sourced to provide ranges of measurements by which design outcomes will need to fall between. A broad range of data is not necessary, therefore it will be important to guide the learners towards identifying what parts of the human body will be affected by the design solution. For example, a chair will consider a number of the measurements around the legs, lower back, and potentially arms and reach depending on the type of chair and its use, but this same data would not be useful when designing a handheld product. It will again be important for the learner to be able to identify the different scenarios in which a design solution will be used. For example the chair might need to be lifted and stacked when not in use, so its weight, the hand grip sizes and the length and reach of the user's arms become important measurements also required.

With the gathering of aesthetic research, a learner wanting to establish the aesthetic preferences of the user could simply provide images of design solutions and ask them what they like and don’t like about each. However a much richer, more proactive alternative approach could be for the learner to establish tasks for the user to complete using the set of images. For example, using the same set of images, ask the user to first order the images from most appealing to least, and once the order has been recorded, reshuffle the set and ask the user to order the images using a different scale, perhaps their perception of most expensive to least. With each task, questions can be asked to establish “why” certain orders were created, and each time the order changes, a photograph could evidence the user's preference.

In order to create a genuine picture of what the context provides in terms of design opportunity, the learner needs to be able to use the skill of enquiry. A range of approaches to choose from include:

* learning from people, a form of empathetic research, in which quality time is spent gaining an insight into the user's’ life
* learn from experts, these are people who provide much deeper knowledge of the challenges. The personality of the expert will be important, do they play thing safely, or are they quite radical?
* Immerse yourself in the context, by living the lifestyle of your user, you can capture unique observations of your own actions
* Analogues inspiration - explore the context through observations of distinct behaviours, activities, emotions expressed, and record rich photographic evidence of this
* Interview users, establish goals you hope to meet through your questioning, organise your questions so that you have a strategy that builds a rapport with the interviewee
* Create a photographic diary, timeline, or image board of observational photographs of design solutions being used in the user's life

## Team role play

Using the IDEO Human Centred Design approach to working with users to establish insight into a context, form a design team and assign one person to be a pretend user, who can then be asked to partake in a series of tasks designed to give the design team different insight into the problem at hand.

The tasks that the design team could use are centred around gaining rich and meaningful insight into a user's perceptions of their lifestyle, how inclusive they feel the design solution is, the ergonomics and anthropometrics of a design solution, and the aesthetic considerations. The better the role play and more realistic the design team can recreate the context, the more useful the process will be.

### Resources

Learner Resource 2 (Available on Teach Cambridge)

## Analysing inclusive solutions

Learners create a task for a range of users to act out. A set of framing questions are asked of the users in turn to explore the thoughts of the user whilst they conduct the task. The task is videoed to reflect on after completion.

Learners should create a step-by-step task, e.g. organise a set of packaging items into different recycling containers using the rules set out by the local council. The learner records the task to support observing the physical activity. Questions are asked of the user e.g. what decisions are hard for this sorting exercise? The learner records all data.

## Class anthropometrics

The class are the anthropometric data range. Learners measure body parts that would be considered for a design solution, e.g. a classroom chair, analyse their findings, compare to the solution measurements and redesign the solution.

In this task, the learners need to measure the solution that is the focal point of the lesson. A chair is a useful accessible example. Learners then measure their body parts relating to the chair, including parts of their legs and back. Data can also be gained on what amount the data group can lift in weight, or how far they can reach or sizes they can comfortably grip. The data is compared to the measurements of the solution. Learners can then redesign the solution to be designed inclusively for just this data range.

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