

Design in theory · supported focus

International Baccalaureate · IB Diploma · Design Technology · HL

Scope and prerequisites

Supported HL focus. First assessment 2027 target; current brief and public guide return 403; 2016 SL/HL briefs are historical. Remaining guide, assessment and practical requirements retain their recorded holds.

Prerequisites: read the stated quantities and units, use arithmetic and the model conditions below. Each lesson develops its own method before independent transfer.

These are original or explicitly fictional teaching examples, not actual measurements or completed assessed learner investigations.

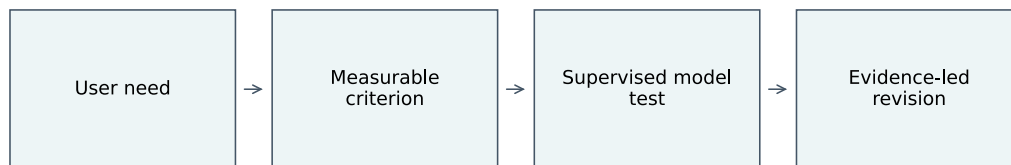
Designing for actual users

■ What would explain this observation?

- A handle that feels comfortable to its designer may exclude another user. Design evidence starts with the people and context of use.
- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- Anthropometric data describe body dimensions. **Ergonomics** concerns the relationship between people, tasks and products. A design **specification** turns a user need into a measurable requirement.
- ergonomics: Designing the fit between people, tasks and products; specification: Measurable requirements a proposed solution should meet.



■ Choose evidence that can test it

- Choose data for the target population and task. Clearance often needs a larger-user percentile; reach may need a smaller-user percentile. A single mean dimension cannot satisfy every design constraint.
- Observe an approved low-risk task with consent, interview users without leading questions, and record measurable success criteria. Test an early model before committing to expensive materials. Do not collect unnecessary personal measurements.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: a handle must withstand a 40 N use force with a design safety factor of 2.5. Target test load = use force $\times$ factor = $40 \times 2.5 = 100$ N. The factor is a design assumption to justify; it is not a substitute for a supervised safety review.

Example:

A use force is 30 N and selected safety factor 3. Find target load. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- A specification is not a list of vague wishes such as nice or strong. User testing should evaluate measurable requirements and reveal conflicting needs.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A population mean dimension always accommodates every user. This claim is false: A specification is not a list of vague wishes such as nice or strong. User testing should evaluate measurable requirements and reveal conflicting needs.

Key:

Designing for actual users: Choose data for the target population and task. Clearance often needs a larger-user percentile; reach may need a smaller-user percentile. A single mean dimension cannot satisfy every design constraint.

Ergonomics: fit a range of users

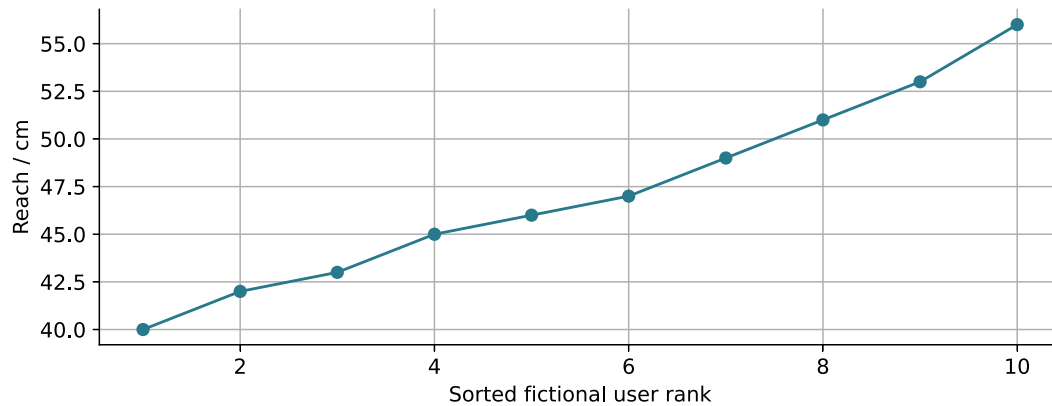
■ What would explain this observation?

- A handle sized for the average hand can exclude many intended users. Design decisions need a user range, task and context rather than one average.

- Start with a prediction. State the quantities or features you would compare, then decide what evidence could distinguish two explanations.

■ Build the model

- Anthropometry** measures body dimensions; **ergonomics** considers interactions between people, tasks and products. A percentile locates a value within a specified distribution. Choosing a lower or upper percentile depends on whether the dimension concerns reach, clearance or another function. Adjustable design may accommodate a broader range than a single fixed dimension.
- anthropometry: Measurement of human body dimensions for a specified population and method; ergonomics: Study of interactions between people, tasks and systems to inform design.



■ Choose evidence that can test it

- A clearance dimension often needs to consider larger relevant body dimensions, while reach can require smaller relevant dimensions. Neither principle automatically selects a universal percentile. The measured population, posture, clothing, capability and task determine relevance. Consider physical, perceptual and cognitive demands together rather than assuming body size explains every usability issue.
- Define a consenting user group and task. Use attributed data or anonymous teacher-approved measurements, record measurement posture and units, and test safe low-fidelity models before construction. Include users whose access needs differ. Set measurable acceptance criteria and retain qualitative feedback about grip, visibility and comprehension alongside dimensions.

■ Work from known quantities

- State the known values and their units. Choose the relation because its assumptions fit this case, then rearrange before substitution.
- Known: sorted fictional reach measurements are 40, 42, 43, 45, 46, 47, 49, 51, 53 and 56 cm. Under a stated nearest-rank classroom convention, the 10th percentile uses rank $\text{ceil}(0.10 \times 10) = 1$, giving 40 cm; the 90th uses rank 9, giving 53 cm. A 53 cm control distance is beyond the recorded reach of eight users. The small fictional sample does not define a product standard.

Example:

A stated nearest-rank method uses $\text{ceil}(p \times n)$. For $p=0.90$ and $n=20$, find the rank. Use the same sequence: known quantities $\rightarrow$ model $\rightarrow$ relation $\rightarrow$ substitution $\rightarrow$ unit and interpretation.

■ Check the conclusion and its limits

- Percentile methods differ, especially for small samples. A percentile is not a percentage of a body dimension. An average dimension and a successful test by one user do not establish accessible design.
- Return to the original observation. Explain what the result supports, which conditions it assumes, and one way to test a competing explanation.

Warn:

A product dimension based on the mean automatically accommodates every intended user. This claim is false: Percentile methods differ, especially for small samples. A percentile is not a percentage of a body dimension. An average dimension and a successful test by one user do not establish accessible design.

Key:

Ergonomics: fit a range of users: A clearance dimension often needs to consider larger relevant body dimensions, while reach can require smaller relevant dimensions. Neither principle automatically selects a universal percentile. The measured population, posture, clothing, capability and task determine relevance. Consider physical, perceptual and cognitive demands together rather than assuming body size explains every usability issue.