

Design Process

1. Define Problem

- Identify a problem
- Validate the problem
 - Who says it is a problem?
 - What are the needs and wants?
 - What are the prior solutions to this problem?
- Justify the problem
 - Is the problem worth solving?
- Create design requirements (specifications)
 - What are the constraints or limitations that must be followed?
- Create a design brief or written plan that identifies a problem to be solved, its criteria, and its constraints

Note: If the problem is not valid or justifiable, a new problem must be defined.

2. Investigate, Research and Generate Ideas

- Research past solutions
- Brainstorm possible new solutions
- Consider additional design goals that could enhance the design
- Analyze each suggested solution or model by creating a chart comparing the pros and cons of each (a decision-matrix)
- Select an approach

Note: If the technology necessary to develop the solution does not exist scientific research may be necessary to pursue a solution.

3. Develop a Solution

- Create a detailed design solution
 - Develop detailed sketches of the solution if applicable
 - Determine specific materials and supplies needed
 - Determine how and when each step of the solution will be accomplished and who will work on each step.
- Justify the design solution

Note: If a solution is found to be invalid or cannot be justified, return to the previous step in the design process.

4. Construct and Test a Prototype

- Construct a testable prototype
- Plan prototype testing
 - Test prototype for performance, usability, and durability
- Test prototype
 - Collect test data
 - Analyze test data

Note: If a testable prototype cannot be built or test data analysis indicates a flawed design, return to a previous step of the design process.

5. Evaluate the Solution

- Evaluate solution effectiveness
 - Does the solution solve the problem?
- Reflect on design
 - Recommend improvements
- Optimize/Redesign the solution
 - Make adjustments to the design where needed

Note: Return to prior design steps and redesign if results are unsatisfactory

6. Present the Solution

- Present oral presentations.
- Develop a project portfolio and written reports if required.
- Use the solution to actually solve the problem or model the process.

