

Innovation

Projects of this type involve the creation and development of new devices, models or technologies. Usually, an original device is constructed or designed that has commercial applications or is beneficial to humans. The design process is as important as the actual end product.

The Design Process

(Adapted from: *Design and Discovery Curriculum, Intel, 2004*)

The design process is a systematic problem-solving strategy used to develop many possible solutions to solve a problem or satisfy human needs and wants and narrow down the possible solutions to one final choice. It is a recognized set of generally defined steps designers and engineers use based on a problem solving strategy that leads to product development.

1- Identify a Design Opportunity.

The design process begins with identifying a need. Notice that opportunities to design a new product or redesign an existing one are everywhere. They often come from a problem that has been experienced personally. The goal is to identify many design opportunities and narrow them down later.

2- Research the Design Opportunity.

Gather a lot of information about the nature of the problem in order to narrow down your choice. Find out if other people experience the same problem and research any existing products or solutions that may currently be used to solve the problem. Choose a design opportunity to address the problem. Write a problem statement.

3- Brainstorm Possible Solutions to the Problem.

Try to come up with as many ideas as you can for solving the problem or addressing the design opportunity. Brainstorming may involve the use of techniques such as *SCAMPER*. Then, narrow down your solutions and choose one to three to pursue further.

4- Draft a Design Brief.

Write a design brief to outline the problem. A design brief includes a problem statement, a description of the user needs, a proposed solution, and often a sketch of the idea or solution. This is a working document that can be changed.

5- Prepare Design Requirements and Conceptual Drawings.

Define the criteria the solution must meet (design requirements) and sketch conceptual drawings.

6- Build a Solution Prototype.

Develop detailed project specifications, consider material properties required, choose materials, and create a working prototype.

7- Test, Evaluate and Revise your Solution.

Evaluate the prototype for function, feasibility, safety, aesthetics and other criteria. Consider how it could be improved. Modify your prototype or create another and test it.

8. Write the Report.

Writing a report about all that was done, how it was done, and what was discovered is an important aspect of a Science Fair Project. Scientists need to communicate their investigation clearly to allow others to conduct the same investigation and arrive at the same conclusions. The written report is a summary of everything you did to investigate your question or problem. It provides information about the extent of the project as well as what you learned through it. The maximum number of pages is 5 plus the bibliography. The contents of the report should include:

Title page: Include first and last name, date, division, category and registration number.

Introduction: This should state the design opportunity and the problem or the need that you want to address. Is the project suggesting improvements to an existing product or creating a new product from a new design?

Research on the Design Opportunity: This section should include what you have learned from your research about what already exists concerning your proposed design opportunity.

Design Brief: Include all design specifications and drawings.

Materials: Anything used in the project (equipment).

Procedure: Steps taken from the first to the final versions of the prototype.

Observation and results: This is the body of the report. Explain whether or not the final prototype meets the design specifications.

Conclusion (Discussion): Summarize details of the project and conditions in which the work was done. This is also a good place to write about possible future endeavours for the topic/ project.

Bibliography: Any science fair project should have had some type of resources consulted; everyone **must** cite all sources used for the project.

Acknowledgments: This is where students acknowledge those persons who assisted them in research etc. Remember the importance of not plagiarizing someone else's work.

9. Make a Display.

The display is an important part of attracting people to the student's project. The display must reflect the topic accurately. For an innovation, you are encouraged to demonstrate how your prototype actually works. This will aid in attracting people, as well generate interest and questions.

The display needs to be neat and organized onto a self-standing background that can be put on a table (see the guide rules and security). It should be self-explanatory and take no more than 5 minutes for an audience to understand from beginning to end.

c) Tips for an effective display that will attract people:

- Have a title that grabs people's attention, use imagination!
- Using bright colors makes the project stand out from others.
- Use a large font, bold writing and limit text.
- Using more pictures, graphs, and diagrams makes the project more interesting and easier to understand. These also can help guide the presentation and emphasize important results and conclusions.

10. Prepare a Presentation.

Prepare a 5 minute oral presentation describing the project. The purpose of the presentation is to share the information and findings with the judges as well as the general audience. Be sure to use language which can be understood by all on-lookers. Ensure that students understand all information being presented, as a question may be asked relating to any aspect of the project. The main goal is to present all information in a clear and understandable way. **DO NOT** memorize a script. Instead of notes, consider using the display as a guide for the presentation. If notes must be used, use point form notes for important points to discuss. Relax and have fun!