



Situation

The Situation, which can also be referred to as a scenario, gives the frame of reference for the problem. This "stage setting" helps give meaning and provides a context to the problem posed to students. The Situation often takes into account factors such as:

- background knowledge of the students;
- new skills or knowledge to be explored;
- availability of materials;
- use of time;
- space.

The Situation should be open-ended enough to allow for a wide variety of solutions to the problem and should be as realistic as possible. The Situations can be posed as a story, either true or invented. The situation should allow for a range of products; from level 1 to level 4.

Problem and Possibilities

Once students understand the Situation presented, they are encouraged to pinpoint a resolvable Problem or Possibility.

This is simply a defining statement of what is to be designed and made, sometimes referred to as a **design brief**. The design brief should state precisely what the problem is, and list any restrictions and/or requirements placed on the design such as: materials, size, usage, time allowed, process to be used, etc.

Investigation and Ideas

During this stage of the design process, students consider any requirements dictated by the problem. Depending on the product some requirements may demand the investigation of any or all of the following criteria.

Appropriateness of size

- How big (small, heavy, etc.) does it need to be to solve the problem?
- Where will the finished product be displayed? How much space is available?
- If different groups are working on components of the same solution, how will size be affected?

Materials

- What are the best materials for this situation?
- What materials are readily available?
- What skills are required to work with the chosen materials?
- How will students acquire these skills?

Economics of production

- How can the problem be solved in the most cost-efficient manner?

Finish

- What type of finish is required to protect or beautify the product?

Testing

- How does the choice of materials relate to strength and how can this be tested?

Surroundings and appearance

- What should the product look like?
- What factors need to be considered?

Performance

- What performance must the product achieve if it is to be successful?
- How might the function relate to appearance?

Ergonomics

- What ergonomic features should be considered to make the design most efficient?

Safety

- What safety precautions will be needed during construction of the product?
- Will the design meet safety requirements?
- How can the design be tested for safety features?

Guiding Student Research

Students need time to investigate a wide variety of requirements and their associated breadth. Research could involve:

- brainstorming with others in the class;
- going to the library;
- reading magazines and/or books;
- using the Internet
- talking to experts in the field;
- visiting stores;
- looking around their homes;
- exploring similar problems and their solutions.

Encourage students to develop a variety of ideas and possible solutions. Brainstorming is one strategy that helps students generate many thoughts. Accept all ideas. Sometimes the more far-fetched ideas lead to interesting solutions!

Choose and Construct

This is the stage of the process in which students take one of the ideas generated during their investigation and produce their product.

Working Plan

The students should create a step by step plan as to how they will go about creating their product. A working plan gives students the opportunity to test out their ideas before the product is actually constructed. It will stem from the sketches and notes they have already made. A working plan should include a good scale drawing of the product, and may even include the making of prototype of the product. The ultimate test of good working plans should always be that sufficient detail is given for anyone to make the product without further questions of the original designer.

At this stage students will also need to consider:

- developing the necessary skills if they do not already have them;
- preparing the materials;
- tools needed;
- construction methods;
- group interaction if applicable.

The product can now be constructed from the appropriate material.

It is important for students to continue to revisit the design problem to make sure that they are working towards a solution to the problem and that their solution will satisfy all of the requirements they identified. Modifications and revisions to the design can be made at any point during the design process, even during construction.

Evaluate

The product is tested to see if it really solves the initial problem. If the product is not satisfactory, modifications are made to the design to rectify any problem. The product is tested again. This process is continued until the product solves the problem. An evaluation of the product should include:

- comparing the perceived requirements with what has been produced;
- how well the product meets each of the requirements.

The intent of the evaluation is to provide a reflective activity for a student that shows them the degree of success and the compromises they made.

Assessing Student Progress

You can assess student progress by observing:

- the stages of the design process that the students need to negotiate
- the technological skills and knowledge required by the students during the design process to effect a solution to a problem.

Observation of the students' end products can be used as an additional technique to estimate the gains made by students. The degree of success and impact on students can be measured, in part, by this solution and their accompanying research and graphic material.

Self-Assessment

Students should assess their performance on the completion of an activity by having them consider:

- What did I do well? How is this shown?
- What areas could be improved and how can I accomplish this?
- What did I learn that I did not know before?
- What would I change if I had the opportunity to start over?
- What am I most proud of that I want to share with others?
- How do I evaluate myself in these areas: planning, designing, finished product, problem solving, working with others?