

Table 3. Technological forecasting

1.	Survey a range of resources (e.g., historical data, Web sites such as Futurist.com, etc.) to extrapolate trends and generate scenarios. Remember, technological forecasting is not pure fiction, but is based on trends and extrapolations.
2.	Focus on one economic or technological sector (e.g., business, communication, entertainment, health, manufacturing, residential, sport, etc.).
3.	List five plausible developments in a single sector or industry in five year base projections into the future (i.e., 5, 10, 15, and 20 years).
4.	Choose one development at one point in time and represent it as best as possible (drawings, words, graphs, etc.).
5.	Provide a brief scenario for this development that you are forecasting. Provide a description of how the invention will be used, what its consequences may be and the way it will be created and disseminated. The scenario may be dystopian, utopian, or mundane.
6.	Provide a brief scenario for planning now to enhance the probability that the forecasted technology will be introduced.

ties of their coming into existence. Futurism is based on the premise that although anything is possible, there are aspects of the future that are highly probable and others that are next to impossible. Just as TA and history are beneficial in assessing the characteristics of change, futurism and TF can help students to anticipate certain changes. Most students find TF to be quite interesting, and even entrepreneurial when it comes to their own variations on existing designs. Although TF provides us with an estimation of future changes, it can also help students evaluate, choose and develop technologies that might best accommodate our cultural, ecological, physical, psychological, and social needs.

Design Briefs

Design briefs are a popular form for challenging students to think creatively and systemically to resolve design-oriented problems. They are the standard form for communicating technological challenges and design specifications. Design briefs are popular in the design fields as well as commerce. In these fields, the design brief may be a contract that is quite complex. All design briefs have common elements. There is descriptive information that sets the stage. There is a section that states the problem to be resolved and a section that describes any special conditions. There is a section that describes any special responsibilities of the designers.

Design briefs used in design and technology courses abbreviate all of these components. The design brief in technology courses is a short, professional document, at

most two pages. It is used to focus the efforts of the student designers. They are one of the most common forms found in technology studies. Design briefs provide an example of how designers actually focus themselves while providing an educational problem-solving experience.

Design briefs can address a range of design challenges. A typical skill-building project, where all students more or less follow the same plans, can be presented in the form of a design brief (or what some call a project brief). For the sake of simplicity, design challenges can take one of two forms. Design challenges may be either *dynamic* or *static*. Dynamic designs are defined by a series of animations or moving parts driven by some power source, including gravity or human energy. Static designs, such as a brochure or table, are defined by the lack of moving parts (a paper that opens along a crease or drawer do not qualify as moving parts). Design briefs can, like design, present students with open-ended or closed problems, or a combination of the two.

The design brief is not merely a single-use document that is referred to at the beginning of the design process. It is referenced throughout the process to ensure that the solution being developed actually fits the problem. It forms the basis for all decisions made by the design team. From a teachers perspective, it is used as a reference point to evaluate the design solutions and to evaluate any other documents submitted by the design team. While design briefs differ from task to task, most share a number of the components in the following format. This is a commonly used format and the standard in technology studies. The example provided is a good example of how a simple challenge can prompt students to think creatively and successfully act on their imagination. It is also a good example of the structure of design briefs.

Table 4. Design brief format

1.	Title: Provide a catchy title.
2.	Background/context: Provide a short description of the background or setting. This may be a fantasy or realistic context.
3.	Problem: State the design problem in clear, concise terms. A clear articulation of the problem situation is essential if the correct problem is to be identified and an appropriate solution found.
4.	Constraints: Provide a comprehensive list of restrictions or parameters that help to shape the design solutions without limiting the solutions to one. Use words such as "Must" and "Cannot." Stay sensitive to the problem of too few vs. too many. Do the constraints limit designs to one solution?
5.	Design considerations: Provide a list of issues all the students should consider. These considerations should define what makes an effective design--effective versus ineffective. These may be reminders and prompters that are ecological-natural, ethical-personal, existential-spiritual, socio-political, technical-empirical, and ecological.
6.	Sequence: Provide a recommended procedure for students to follow. This should give them direction.
7.	Related studies: Provide a list or description of subjects necessary in order to solve the problem.
8.	Management issues: Provide a timeline of dates and times that the students will adhere to.
9.	Self evaluation: Provide a way for students to evaluate themselves.
10.	Assessment: Provide a scheme that you will use to assess the students and their designs.

Opinions differ on the creation of design briefs. In most cases, design briefs will be prepared prior to the beginning of the design challenge (by the teacher or other professionals). In some cases, the design briefs will be prepared by students, or groups of students working together on a common design problem. Here, teachers and students refine the problem together and the students prepare their design briefs. Either way, it is important to provide a format for the students to follow.

Table 5. Fasten(at)ing technology—paper clips

Context

In the family of fasteners, a paper clip is what you might call a simple, elegant solution to the problem of squeezing or clenching paper. Paper clips are easy to reproduce, easy to use, hold papers together without causing damage or crimping, and have many other uses besides clenching. This is only partially true. Paper clips do cause damage. Some get rusty and stain the paper. Some are too inflexible and leave a permanent crease or crimp in the paper. Your challenge is to improve fastening technologies by designing the perfect paper clip.

Problem

Design and construct a fastener for paper.

Design constraints

1. The fastener must be designed so it is reproducible.
2. The fastener or clench must be made of one or two single, continuous pieces of material.
3. The fastener must hold two and more sheets of paper together.
4. The fastener must be portable and reusable.
5. The fastener must not damage the paper.
6. The fastener can be made from any material.
7. The design must be scalable (e.g., from paper clip to money clip)

Design considerations

- Pay close attention to the elegant function of the fastener: does it effectively clench?
- Consider a wide range of possible fastener designs.
- Review the range of paper clip designs presented, but do not duplicate these.
- Is the fastener reproducible and scalable?

Construction Sequence

1. Brainstorm ideas for the fastener's operation and appearance.
2. Sketch four or five designs and choose appropriate features, forms and materials.
3. May use 2D computer aided design (CAD) or 3D modeling techniques to lay out mechanisms and parts.
4. Locate recycled materials or new materials.

Table 5. continued

5. Test the materials for the properties.
6. Bend and finish the final prototype fastener.
7. Test the fastener.

Management Issues

- **End of day 1:** Approval of fastener ideas.
- **End of day 2:** Fastener prototype and sketches explained, presented and submitted.

Related studies

- | | |
|------------------|---------------|
| • Physics | • Sociology |
| • Business | • Psychology |
| • Social Studies | • Engineering |

Honest self (group) evaluation

1. We stayed within the design constraints and deadlines.	_____ out of 5 marks
2. Our fastener is unique in its design.	_____ out of 5 marks
3. Our fastener has makes effective use of materials.	_____ out of 5 marks
4. Most of the excess materials can be reused or recycled.	_____ out of 5 marks
5. Our use of materials was creative, economic, and efficient.	_____ out of 5 marks
6. Our fastener successfully satisfies all the design brief requirements (i.e., holds two and more sheets of paper together; is portable, reproducible, reusable, scalable).	_____ out of 5 marks
7. The demonstration of our fastener was creative and entertaining.	_____ out of 5 marks
Total	_____ out of 35

Assessment

Group's self assessment	_____ Total/ 35
Design principles	
Features and form	_____ out of 10
Originality	_____ out of 10
Economics and ecology	_____ out of 10
Craft and quality	_____ out of 10
Clenchability	_____ out of 15