

# 6 STUDENTS' MANUAL





## **Implementation of an invention towards ASTI Leap Challenge: Detailed version**

- 1. Understanding the title with its related problem(s) and objective(s).**
  - 1.1 Find a problem you want to solve related to the theme.
  - 1.2 Discuss the basic answers/ideas to the problem(s) associated with the project with the group.
  - 1.3 Discuss the objective with your teacher advisor and members.
  
- 2. Gather all the apparatus.**
  - 2.1 Know the use/ need of each equipment/apparatus.
  - 2.2 Read, understand and follow the precautions and advice on handling some equipment/apparatus.
  - 2.3 Double check and ensure all the equipment/apparatus are obtained.
  
- 3. Read and analyse the procedures to get a clear vision of the project.**
  - 3.1 Understanding of the steps by all the team members.
  - 3.2 Draw-up a work plan by the hour/day by dividing each step, observation and research among the team members. (*Involvement of each member is compulsory*).
  - 3.3 Plan and determined the place(s) to run the project.
  - 3.4 Prepare a timeline for:
    - 3.4.1 preparing the model/invention.
    - 3.4.2 observation and data collection.
    - 3.4.3 team gathering for discussion/ sharing info.
    - 3.4.4 appointment with advisor, teachers, facilitators and project related personalities.
    - 3.4.5 completing the project and report, poster, model, etc.
  - 3.5 Get to know the judging criteria from the advisor before constructing, presenting and explaining the project.





4. Conduct your invention as in The Methodology below and during the process, keep detailed notes of each and every step, measurement and observation in a journal/logbook. Do not rely on memory alone. Use data tables or charts to record your quantitative data.

#### **4.1 The Methodology**

The following is the Methodology with some key questions and directions on how to design and invent.

##### **4.1.1 Problem/Purpose**

- What is your goal?
- What idea are you trying to test?
- What is the problem you are trying to solve?

##### **4.1.2 Procedure**

- Give a detailed explanation of how you will develop your invention to solve your problem.
- If your invention requires the scientific method to test its effectiveness, be clear about the variables (*manipulated, responding and fixed variable*) versus your controls (*elements of the invention that do not change*).
- Another person should be able to try out or use your invention following your procedure. Test this with a friend or parent to be sure you have not forgotten anything.





#### **4.1.3 Materials/Equipment**

- List all the materials and equipment that is used for your invention.
- Your list of materials should include all the ingredients of the procedure recipe.

#### **4.1.4 Observations/Data/Results**

- Keep a detailed journal/log-book of observation, data, and results. Your journal/log-book should contain data measurements and written notes about what you are sensing (hearing, seeing, or touching) about your invention.
- If appropriate, photograph your project results or phases of the project to help your analysis and possibly to demonstrate your invention on your exhibit board. For example, note down when your invention did not work and how you will overcome this issue.

#### **4.1.5 Analysis**

- Explain your observations, data, and results. This is a summary of what your data has shown you.
- List the main points that you have learned.
- Why did the results occur? What did your invention solve?

#### **4.1.6 Conclusion**

- Answer your problem/purpose statement.
- What does it all add up to? What is the value usage of your project?
- What further study do you recommend given the results of your invention or solution? What would be the next question to ask?
- If you would improve this project/invention, what/how would that be?





## Constructing a Display

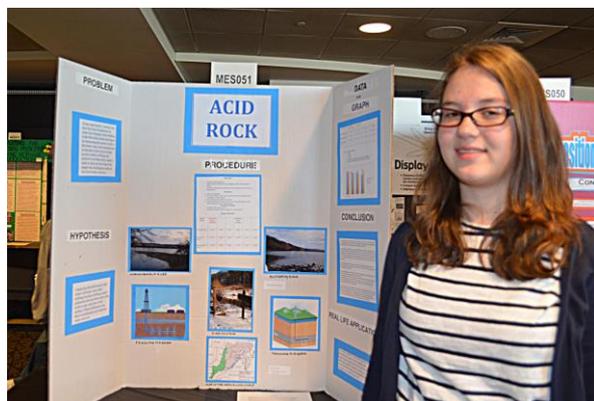
The purpose of a presentation or display is to communicate the project to others. That means showing **what was done, how, and why**. The presentation or display summarises the parts of the project **clearly, accurately, and briefly**. The presentation or display cannot and should not show every idea that was considered every piece of data that was collected, or every trial of every test.

The display board can be made of poster board, laminated cardboard, plywood, foam board, or panelling - either taped or hinged together. Whatever materials you choose, make sure **your presentation or display conforms to the rules set by your teacher**. You may even use the wall to display your results as a means to reduce cost.

The rules may allow some flexibility in how display boards are presented. Often, students place the title and results of their experiment on the centre panel. Aims/objectives, materials, and conclusions appear on the other panel.

Do not present or display any materials that are potentially hazardous, spillable, or perishable.

**Do not displays live animals.**





Plants are **sometimes** prohibited. Check with your teacher.

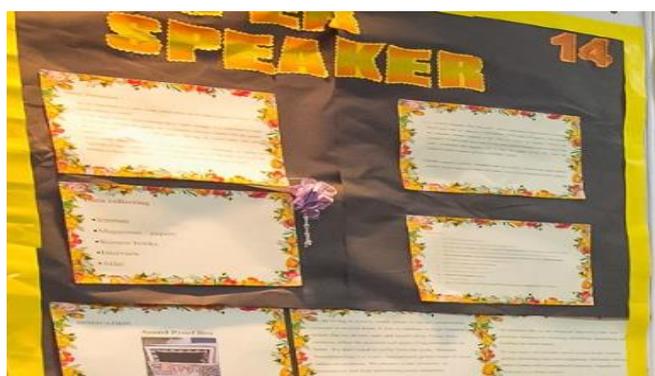
Although the judges at ALC School Level are more interested in the method and content of a project, the presentation does matter. Neatness is essential. Choose attractive colours for the display board, and make titles using large fonts that are easy to read. Use drawings and photographs for two purposes:

- To show methods and results.
- To make the display visually interesting.

Be creative. If borders, fonts, text boxes, and clip art help communicate your project effectively, use them. The style will never win over substance in your project, but it can help a good project stand out from the rest.

ALC require students to stand beside their projects to explain their work to visitors and to answer questions from the judges. The tips here are:

- stand tall.
- speak with confidence.
- answer questions honestly and briefly.
- admit mistakes and tell how you can correct them the next time you do an invention/project.
- let your enthusiasm show.





## ***What Must a Project Report Contain?***

ALC also requires you to prepare a simple 3-page report. Ask your teacher for the limits

First, let's consider what a project report **is not**.

- It is not reading from a textbook or studying for a test.
- It is not a reprise of an invention done in class, nor should it be drawn from any textbook.
- It's not a normal book report, scrapbook, term paper or speech.
- An ALC project report is not based on library or internet research on an assigned topic.
- An ALC project is not just learning in the classroom. It is acting as an innovator does: looking for a solution using creative thinking, critical thinking and design & innovation thinking using a hands-on method.

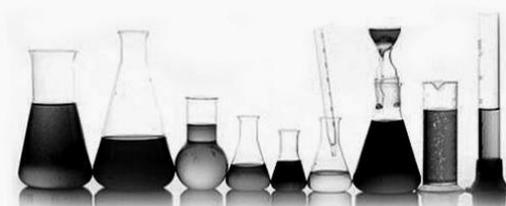
In short, an ALC project report requires students to look for a solution to solve problem hands-on. The first step in planning any project/invention report is to find out exactly what those rules are and follow them to the letter. Although guidelines vary, for your project report, it should include the following components:

- **Title**  
The title of the project should be the title of the invention.
- **Problem Statement**  
In this section, students need to state the problem they found and state what they hope to achieve in the project.
- **Relevance to the Theme**  
The students need to mention how their invention is related or relevance to the given Theme.
- **Description of Invention**  
The description of the invention must be stated in the report to explain how the invention works, and how it solves the problem identified.





- **Originality**  
Outline existing features vs. innovation features of the new model  
OR  
why the invention is original.
- **Diagram with specifications**  
The report must have a diagram of the invention and it should be also labelled
- **Cost Analysis**  
The report should state how much it cost to do the students' invention. A breakdown of the cost involved in the project/invention can be mentioned here.
- **Benefits**  
Students should explain how their invention is going to benefit them or anyone else.
- **Conclusion and Future Work**  
The conclusion of the report and the future work for the invention have to be mentioned in this part of the report.
- **References (or Bibliography)**  
The list of sources used for the invention and to do the report.





## **Example of Complete Contents of Project Report**

### **1. Front Cover**

- Title of the invention
- Name of the school
- Name of the teacher advisor
- Name of group members

### **2. Contents with page number**

### **3. Introduction**

- A brief summary of your project

### **4. Project Record (as in the Students' Manual)**

- Title
- Problem statement
- Relevance to theme
- Description of invention
- Originality
- Cost analysis (optional)
- Benefits
- Conclusion & future work

### **5. Photographs and Diagrams, Life Examples**

### **6. References**





## **ALC Tips**

### **1. Tips for Selecting a Topic:**

An important factor in selecting a project is to find one in which you have enough interest to maintain the project from beginning to end. Some projects are completed in several months, and some can be completed in a few weeks.

The project should be broad enough to allow in-depth study of the team members but narrow enough that it can be researched in the time available. You should know your own capabilities, costs should be considered, as should the amount of support from other people which will be needed for transportation and research.

If possible, attend other innovation competitions to get ideas for future projects. Pay attention to thinking innovatively; talk to other students about how they selected their project. Remember share ideas and advice with other teams. For ALC learning is more important than winning.





## 2. Tips for Completing the Work without Significant Stress

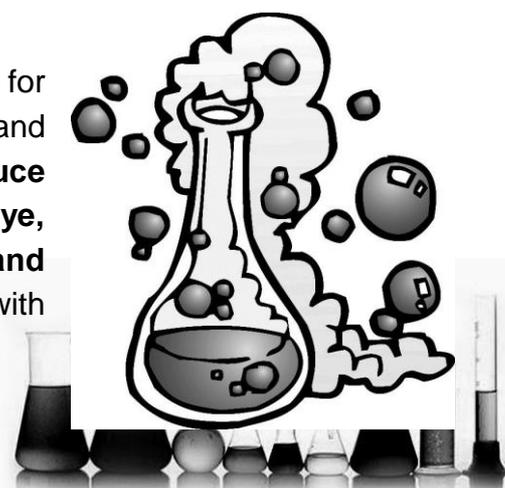
**Start early.** Plan to work on the project every day and every week; **make a schedule** for your work and stick to it. When the research is done, and the invention/project has been completed, remember that the project must still be presented to a wider audience. **Take time in completing the display board first.** Then be sure to **practice** describing your project to your family and friends; **listen** to their questions to find gaps in your presentation and/or display board and make some corrections. Remember that you know the project the best and need only share with your audience what you did.



On the competition day, **dress for success.** Along with your display board and materials, be sure to take a table and chair if you need them for displaying your project. Some students also bring a table covering to add colour and interest to their display. **Simple display boards** can be very effective, and that the project will be evaluated more on what you have done and what you have learned. However, the creativity of a project will be rated more favourably by judges **if time, care and the effective use of design are understandable.**

**Use lettering for the headings that can be read five feet away.** Use **one or two colours** to attract attention to certain features of your project that are special. Talk to the art teacher for advice on layout. **Use a large font size** for any written work displayed on the backboard. Type the written work if possible, and present it as professionally as possible, with a cover and an inviting layout. Make sure the first sentence of your report is very interesting so that anyone who reads it would want to know more.

Then, be sure to take a book with you in case the wait for the judges is long. Be on the lookout for the judges and **stand up when they approach you.** **Introduce yourself, offer to shake hands, look them in the eye, and say confidently to yourself, "I can do this, and my project is really great!"** Make your presentation with animation; allow your interest to show!





### 3. Tips for Presenting the Project in Original and Creative Ways (Making the Display):

The school-level competition boards can be purchased or created from plain brown cardboard sheets, lightweight plywood, or foam board. Most students seem to purchase a board (actually cardboard) from a store or from their teacher at the school. There are size conditions that must be followed. Sometimes students put a bridge over the top, holding the board open and promoting the project simultaneously. Avoid confusion. Use at most two or three colours. Label all data tables, charts, graphs, or photographs you use. Artwork, diagrams, and other elements of the display should be your own work. Use of logic and careful planning of the board will result in an attractive display. **Coordinate with the organisers on this matter.** However, if they are preparing the boards, then prepare your presentation as per their requirements.

### 4. Tips for Demonstrating the complexity of the Project and the Depth of Knowledge:

When students begin an ALC project, they may have some idea of how the invention will turn out, and they may have some background knowledge. A good project is one in which students have done extensive research on the topic, demonstrates creativity and originality in project selection, approach, display and expression by the judges are of critical importance also. Remember that you know your own project better than anyone else and should be able to explain what you did and what you learned and what you plan to do next to anyone who asks!





### **Appendix: Some extra Information you may find useful**

- Some computer software packages refer bar graphs as column graphs. If you are using a software package of this type, select column graph as your graph type.
- Comparisons to the U.S. system:  
A meter is about 39 inches, or 3 inches more than a yard. A 12-inch ruler is about 30 centimetres long. One inch is about 2.5 centimetres.
- Comparisons to the U.S. system:  
One litre is a little more than a quart. A 1-cup measuring cup holds about 250 millilitres. A teaspoon is about 5 millilitres.
- Comparisons to the U.S. system:  
A kilogram is 2.2 pounds. One pound is 454 grams. One ounce is 28 grams.
- Comparisons to the U.S. system:  
In the United States, they often report the weather, body temperature, and other temperature measurements in degrees Fahrenheit. The boiling point of water (at sea level) is 212° Fahrenheit or 212°F. The freezing point of water (at sea level) is 32°F. Room temperature is about 70° F. Human body temperature is 98.6° F.

To convert degrees Fahrenheit to degrees Celsius, use this formula:

$$C = 5/9 (F - 32)$$

**Example:**

To convert 50°F to °C,

Subtract 32 from 50.

$$50 - 32 = 18$$

Multiply that answer by 5.

$$18 \times 5 = 90$$

Then, divide the product with 9.

$$\begin{aligned} \text{Temperature} &= 90 / 9 \\ &= 10^\circ\text{C} \end{aligned}$$





- To convert degrees Celsius to degrees Fahrenheit, use this formula:

$$F = 9/5 \times C + 32$$

**Example:**

To convert 30°C to °F

Multiply 30 by 9

$$30 \times 9 = 270$$

Divide that product with 5

$$270/5 = 54$$

Add 32 to your answer

$$\begin{aligned} \text{Temperature} &= 54 + 32 \\ &= 86^\circ\text{C} \end{aligned}$$

