Teen Start-Up

Digital Design Unplugged

Problem solving tips and tricks

"If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions."

— **Albert Einstein**

Lighthouse introduced Teen Start-Up in 2015 to encourage entrepreneurial thinking in all young people interested in innovation, creativity and problem solving. We want them to think about solutions to problems they or their generation faces now or in the future. We want to inspire their thinking and know that they can make a difference all while having fun.

What is Digital Design unplugged?

Digital design is used in the development of websites, mobile apps and other online content for a range of industries. But as the platforms and designers get better at what they do, it is also being used in the creation of solutions in building, transport, health and eduction to help build new models and tools that make those industries more effective.

This booklet looks at how you can plan, investigate, create and test your approach to problems and their solutions without using any fancy and expensive computer equipment. Think back to the days of Einstein - what equipment would he have had available to him when he developed the Theory of Relativity**?**

If you look around your room or home, you will find all the tools you need to complete the tasks in this booklet. So let your imagination run wild and have some fun solving problems that are important to you.

Problems are nothing but a wake up call for creativity - Gerhard Gschwandtner

Problems come in all shapes and sizes but the one thing they have in common is that they make doing something hard or complicated. The reason we want to solve problems is to make it easier for us or someone else to do something.

Problems can affect YOU, your family, your friends, your school, neighbours or society as a whole.

SOLUTIONS THAT CHANGED THE WORLD

John Kemp Starley invented the bicycle in 1885. His uncle had developed the penny-farthing (look it up and see how hard that would have been to ride). John thought the there would be so many more people interested in buying a bike if it wasn't as scary or dangerous to ride as the penny-farthing.

When he first displayed his idea in 1886, everyone thought he was a bit crazy. But when he included the newly invented pneumatic tire – the rest, as they say, is history. The bike became the first affordable method of getting around towns and cities and they gave women, in particular, the opportunity to gain a bit of independence.

Today pretty much everyone has a bike or has ridden one at some stage in their lives. During the current pandemic, bicycles have become known as the new "toilet paper' with one bike being sold somewhere in the world every two seconds.

What problem/s would you like to solve and Why

PROBLEM	WHY DO YOU WANT TO SOLVE IT?
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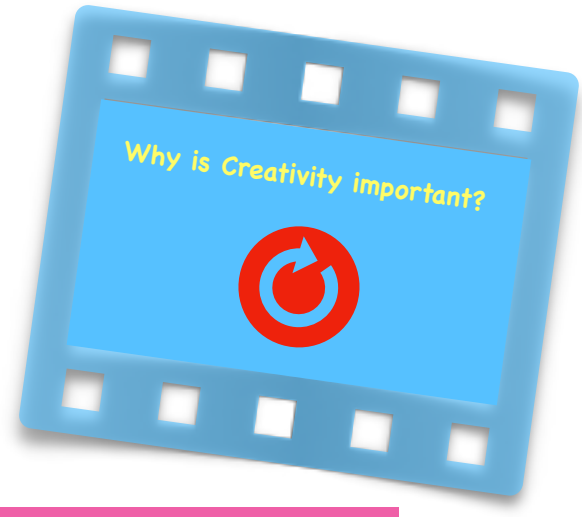
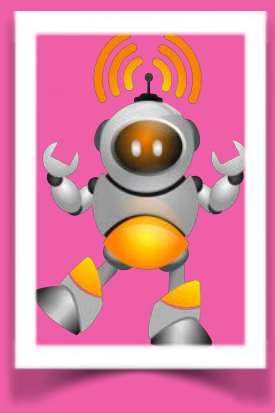


If you aren't sure where to start, the problem can be related to:

- Transport
- Energy
- Health
- Sports
- School
- Anything that is of interest to you.



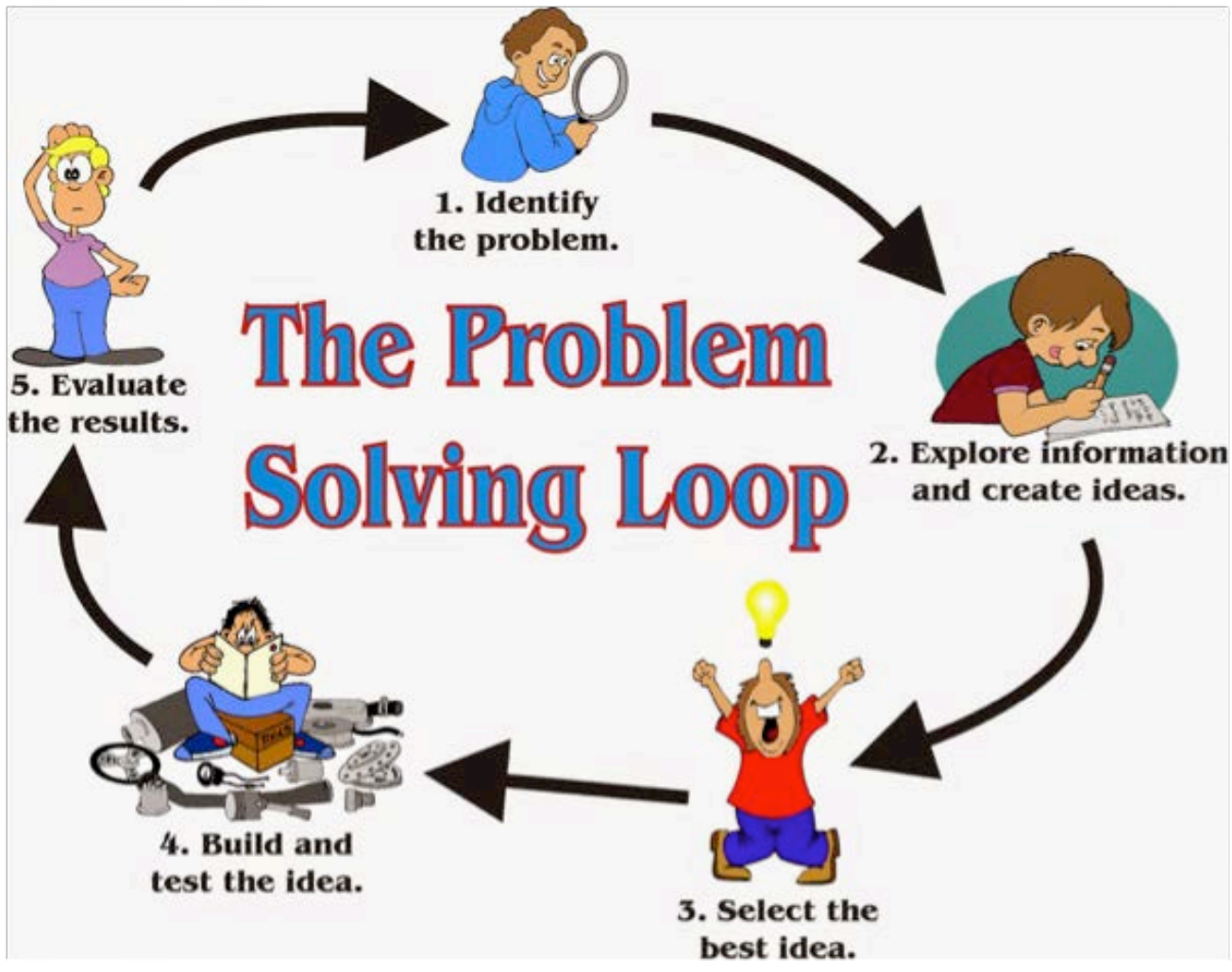
SOLUTIONS THAT CHANGED THE WORLD

Wifi is short for Wireless Fidelity and is a network technology that allows computers, some mobile phones, games and other devices to communicate over a wireless signal. Can you imagine life without if? Many people have contributed to the development of WiFi but one key component was developed by the CSIRO in Australia. The work actually came about because a bunch of scientists where trying to solve the problem of radio waves bouncing around and off indoor surfaces. This caused an echo, which distorted the signal and didn't give them the right results in their experiments. They fixed this by building a faster chip that could transmit a signal and reduce the echo and this greatly improved the signal quality of WiFi.

Sometimes the solution to one problem can in fact solve many others.

Problem-solving is about using different tools and techniques in an organised way to find solutions to problems.

When we talk about organised, we mean that there is a process you follow when solving problems. The process looks kind of like this.



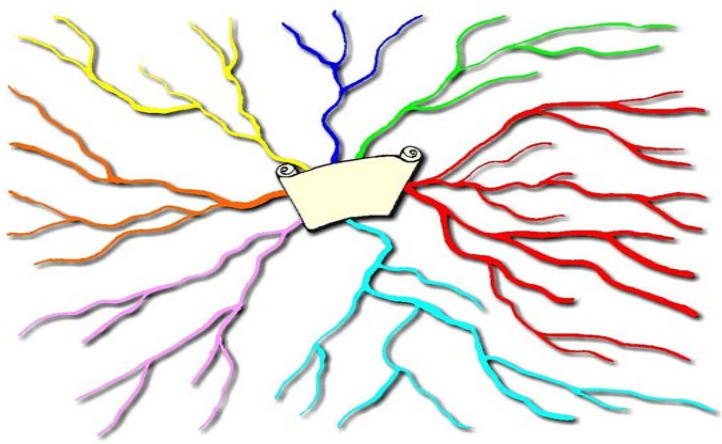
You identified some problems that you are interest earlier, so lets look at the other steps.

Explore information and create ideas:

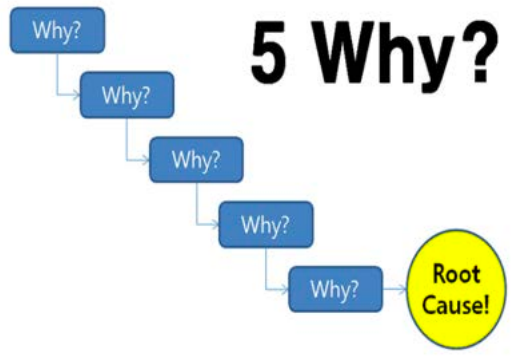
This is where you do some research to really understand whether or not what you have identified really is a problem and who is affected. Sometimes you have to break a problem down into smaller parts to help you find out what is really causing the problem - this is called THE ROOT CAUSE.

There are a lot of tools you can use to do this including:

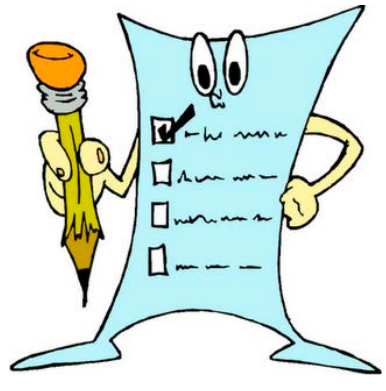
- Mind maps (which many of you have used at school) - to help you group different ideas and follow a trail that leads to the root cause.



- The 5 Why's - ask 5 questions about the problem each starting with the word why. The aim is to find out 'why' this is a problem and what really causes it.



- Google - do some good old fashion desk based research.
- Prepare a survey and ask people you know if they have the same problem and why its a problem for them. You can write the questions so that you can test your thinking about your particular problem.



My research results:

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My ideas for solving the problem:

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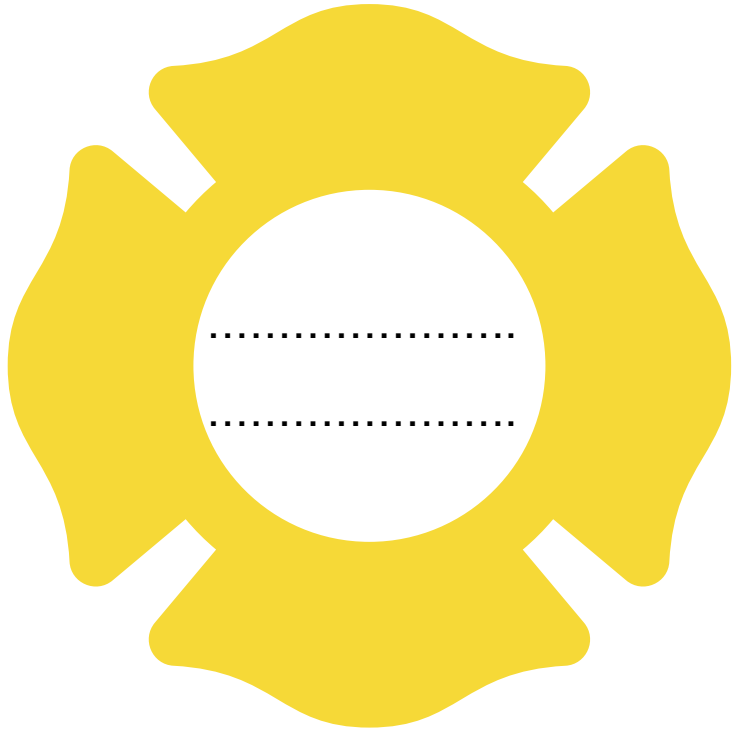
Select the best idea:

Based on your research which of the solutions that you have identified do you think will solve the problem best?

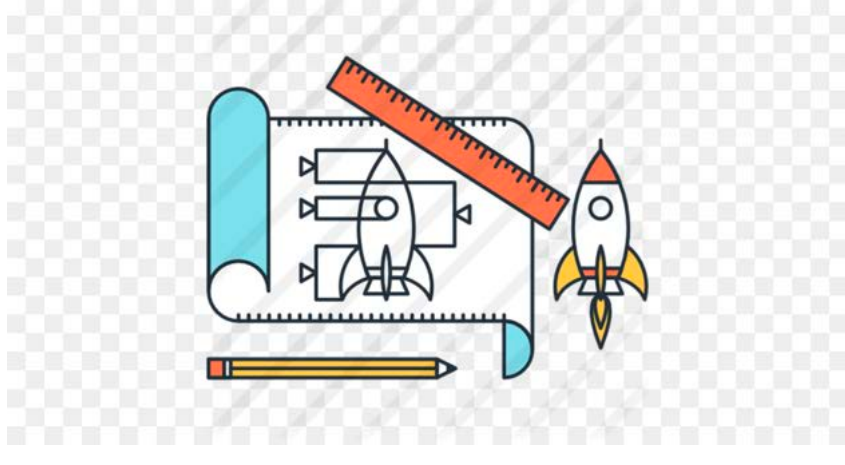


SOLUTIONS THAT CHANGED THE WORLD

Bertie the Brain was one of the first game playing machines developed. It was built in 1950 by Josef Kates. It measured more than 4 metres tall and allowed people to play a game of noughts and crosses against an artificial intelligence. It was built for an exhibition and was dismantled as soon as the exhibition was finished. Kates didn't build the game to demonstrate how much fun it could be, he actually built it to demonstrate a miniature version of the vacuum tube he had designed. The vacuum tube was used in the design of computers for a while, but was quickly replaced by the transistor.

Computer games have come a long way since those days. Today there are over 2.2billion gamers in the world. This means that almost one third of the worlds population are playing games on a PC.

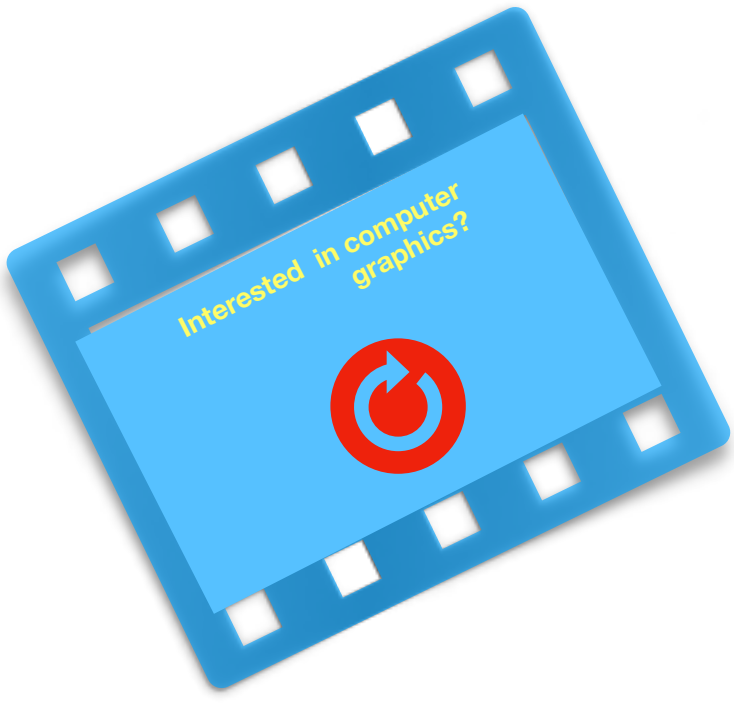
Build the idea:



This is what people mean when they talk about PROTOTYPING. This means to build a model of your idea so that you can test it with others to see if it solves the problem.

Your prototype can be:

- A drawing.
- A presentation.
- A model built out of materials you have available at home.
- With lego or other building blocks.
- In Minecraft or some other program.
- A video.



For a bit of fun - create a new character for your favourite game. What does your character do in the game and how does it help you win the game?

Test your idea:

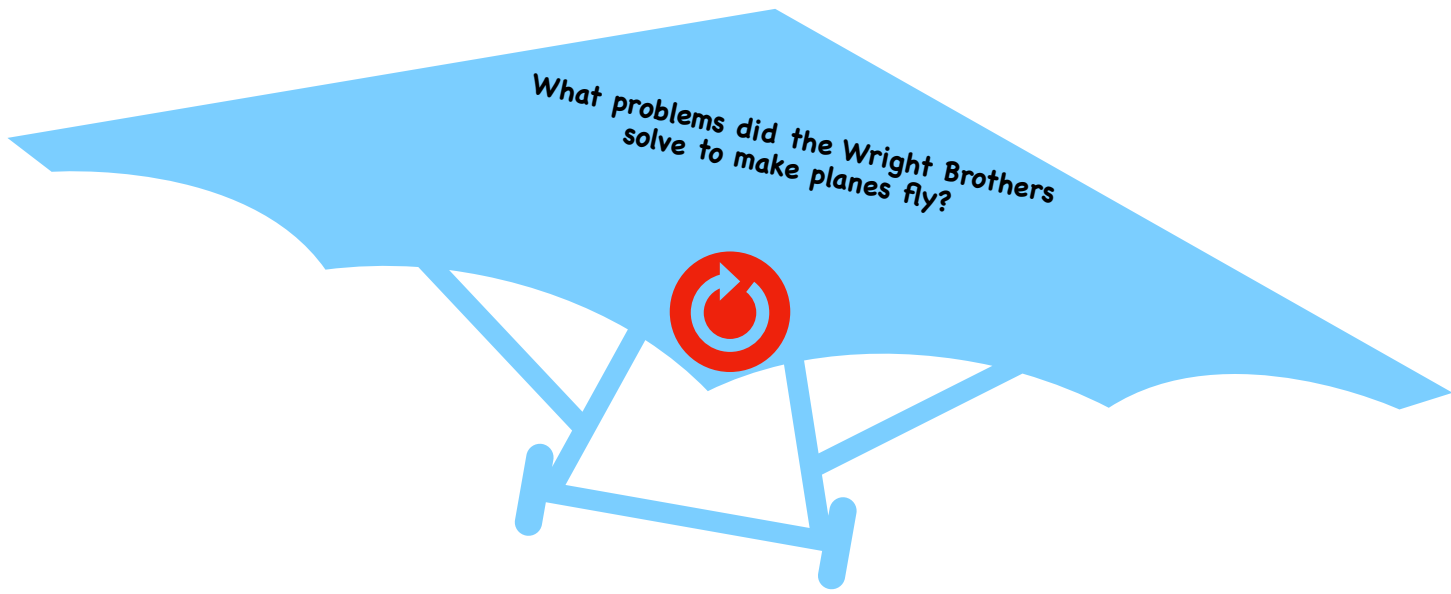
Now that you have your prototype you need to test it. You do this by asking people to use, comment or read about your prototype and give you feedback on whether or not they think it solves the problem you have identified. This is called USER TESTING.

Evaluate your solution:

After you have finished your user testing its time to decide whether or not your prototype or solution solves the problem. If you believe it does, that's great. If it doesn't or only solves part of the problem, then you revise your solution. Pretty much every new idea is not right first time and goes through a process of ITERATION - you rinse and repeat and try it all again.

For a bit of fun - create your own game that takes the players through the process of solving the problem you identified and help the players create their own solution. The game can be a card game, a board game or something a bit more technical.

Enjoy!



You have completed the Digital Design Unplugged challenge (or at least for your first idea).

The approach your have worked through can be used to solve a range of problems from the very simple (for example how to get the perfect slice of toast) to the complex (for example, how do I build a house that is energy efficient and disability-friendly).

This is the first of a range of booklets we will be producing. We are always happy to take feedback or suggestions for new topics you would like included. if you have some ideas you would like share send them to enquiries@lighthouseinnovation.com.au