



# dream big!

*Innovative and engaging STEM  
programs in elementary and middle  
school - UK and USA.*

Churchill Fellowship - Neil Bramsen  
Mt Ousley Public School



# Dream BIG

When I grow up, I dream that I will...

*be a doctor*

One day, I dream that...

*There will be a cure for cancer*









Australian Government

Chief Scientist

The background of the central section is a dark blue field filled with glowing white and light blue elements. These include various chemical structures, such as a benzene ring with a carboxylic acid group, and numerous mathematical symbols and formulas like  $CH_2CHO$ ,  $CH_3$ ,  $OH$ ,  $H$ ,  $C$ ,  $O$ ,  $N$ , and  $CH_2OH$ . The overall effect is one of complex scientific and technological data.

# SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS: AUSTRALIA'S FUTURE

SEPTEMBER 2014



Aust

Australia's STEM teachers at all levels, from primary to tertiary, must be equipped to deliver course content with confidence and inspiration, and develop all students to their full potential. Curricula and assessment criteria should prioritise curiosity-driven and problem-based learning of STEM—STEM as it is practised—alongside the subject-specific knowledge that STEM requires.

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# SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS: AUSTRALIA'S FUTURE

SEPTEMBER 2014

Our students?







critical thinkers

communication

authentic learning

global

digitally literate

initiative

interpersonal skills

problem solvers

connected

ICT proficient

innovative

imaginative

entrepreneurialism

collaborative

media literate







people

places

conversations

observations

sharing





# Project Based Learning

High Tech High  
San Diego





HIGH TECH ELEMENTARY

# **The Hive**

## **Unorthodox Teaching Design & Brainstorming**

**Room 153**













I dream big like a big star sleeping

I understand how other people feel

I walk by myself when I feel blue

I hear little kids screaming in my ear

I want a phone to remember phone numbers

I am myself just me, only me

I wonder why the world spins

I hope for world peace to come back

I am a big dreamer

I pretend to fly with the birds

I feel the breeze running on my face

I see my reflection looking at me

I am a happy nine year old

I touch my dogs sweet soft fur

I cry when I am hurt























# design and build a working car ?

The display board is a project showcase for a car-building challenge. It features a green background with a black road winding through it. Various student work samples are pinned to the board, including:

- Hand-drawn diagrams of car chassis and wheels.
- Photographs of students working on their projects.
- Small green signs with text such as:
  - "We researched with Lego cars to make our ideas."
  - "We looked at the tracks of the car - we decided we needed a thick track for extra more friction."
  - "We marked out the road of our cars using our skills from maths."
  - "We measured and used wood to build our..."
- Two large, light blue, 3D-printed or constructed car chassis models.
- Two white plastic storage bins at the bottom.





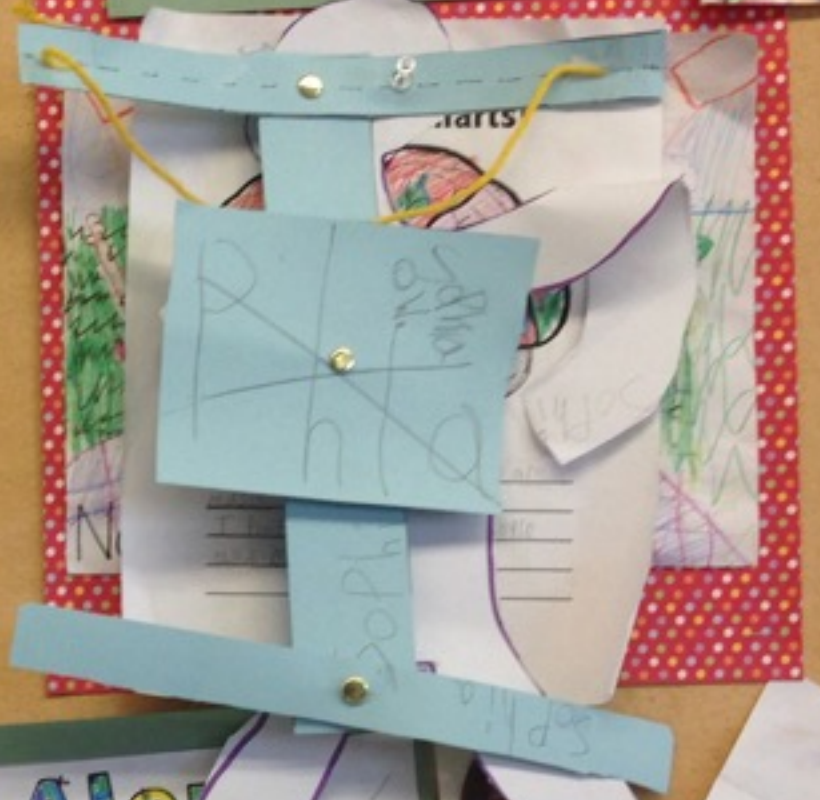
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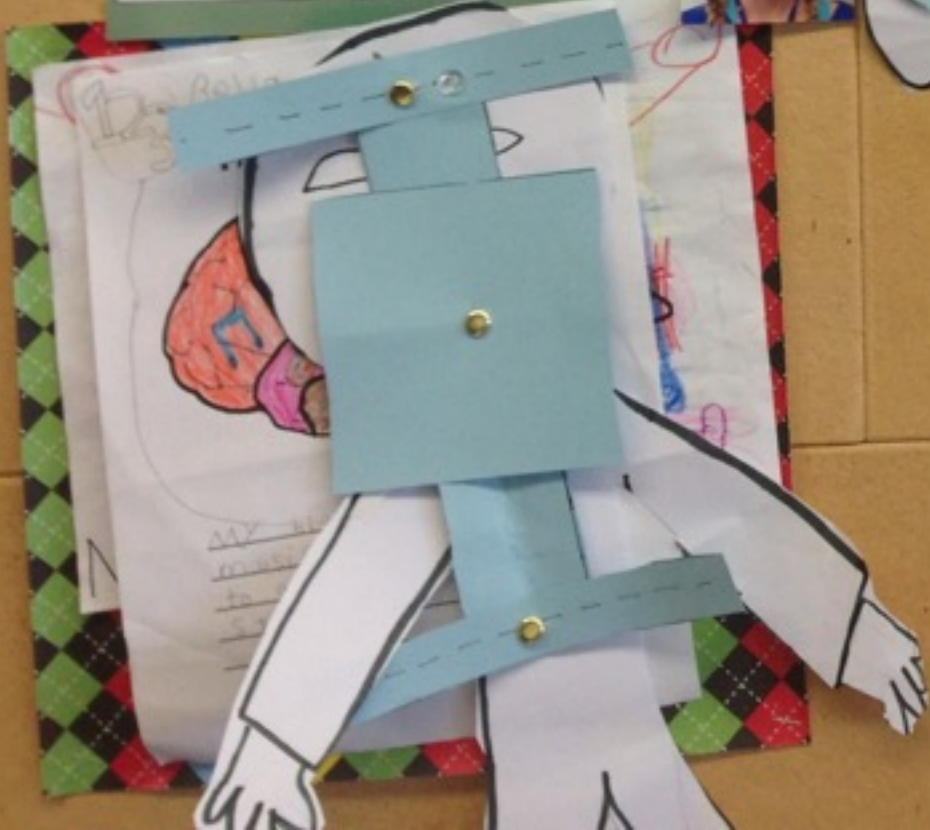
Allen



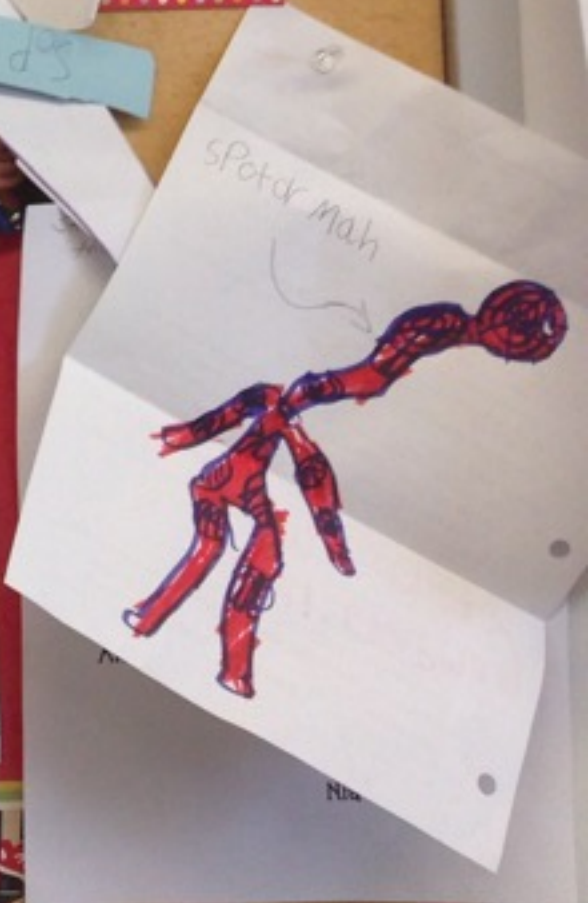
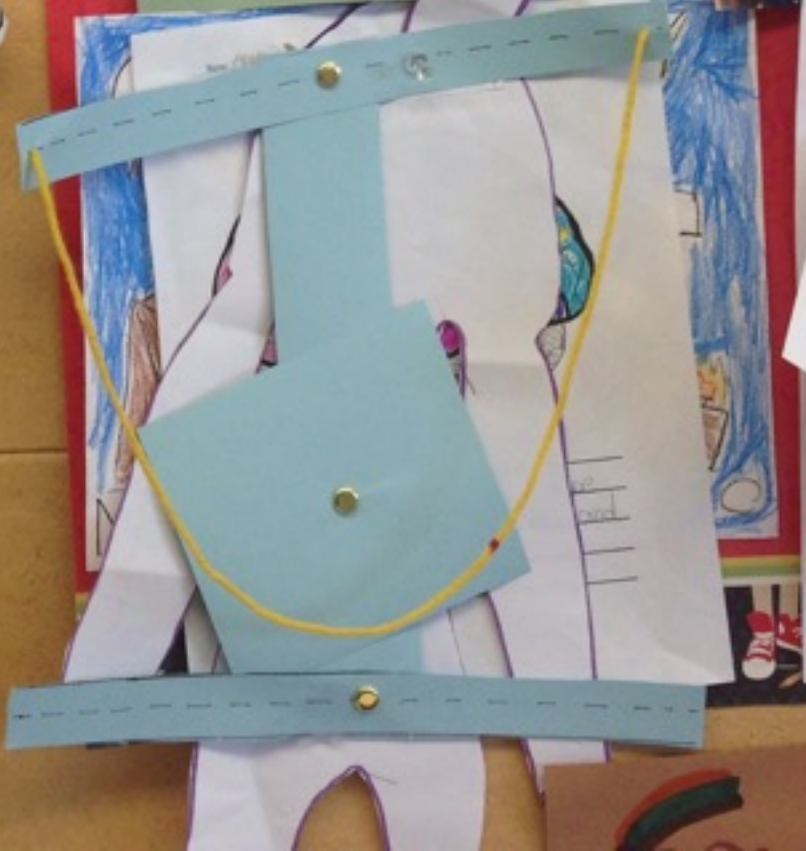
Sophia



Bella



Alon


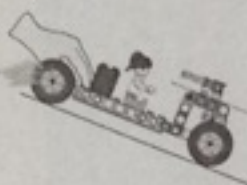

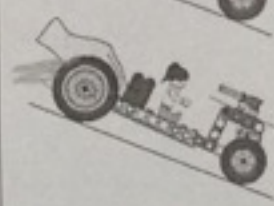






KO 601

# Testing Different Weights and Wheels

	Test #1 Distance in inches	Test #2 Distance in inches	Test #3 Distance in inches
<b>Small wheels</b> <b>No extra weight</b>  <p>Don't forget to reset the spinner prior to each test run!</p>	1.6 m	1.5 m	1.3 m
<b>Small Wheels</b> <b>With extra weight</b> 	1.8 m	2.6 m	2.7 m
<b>Big Wheels</b> <b>No extra weight</b> 	1.3 m	.5 m	1.7 m
<b>Big Wheels</b> <b>With extra weight</b> 	2.9 m	2.9 m	3 m





### Base Prototype

What are all the parts of the base?

How did you design the steering in your base prototype?

How did this prototype help you build your car?

## Base Prototype Criteria

1. There needs to be room for your legs and you need to reach the steering.
2. The seat needs to be 5 inches wide.
3. The axles should be longer than the seat.
4. The axles should be the same size.



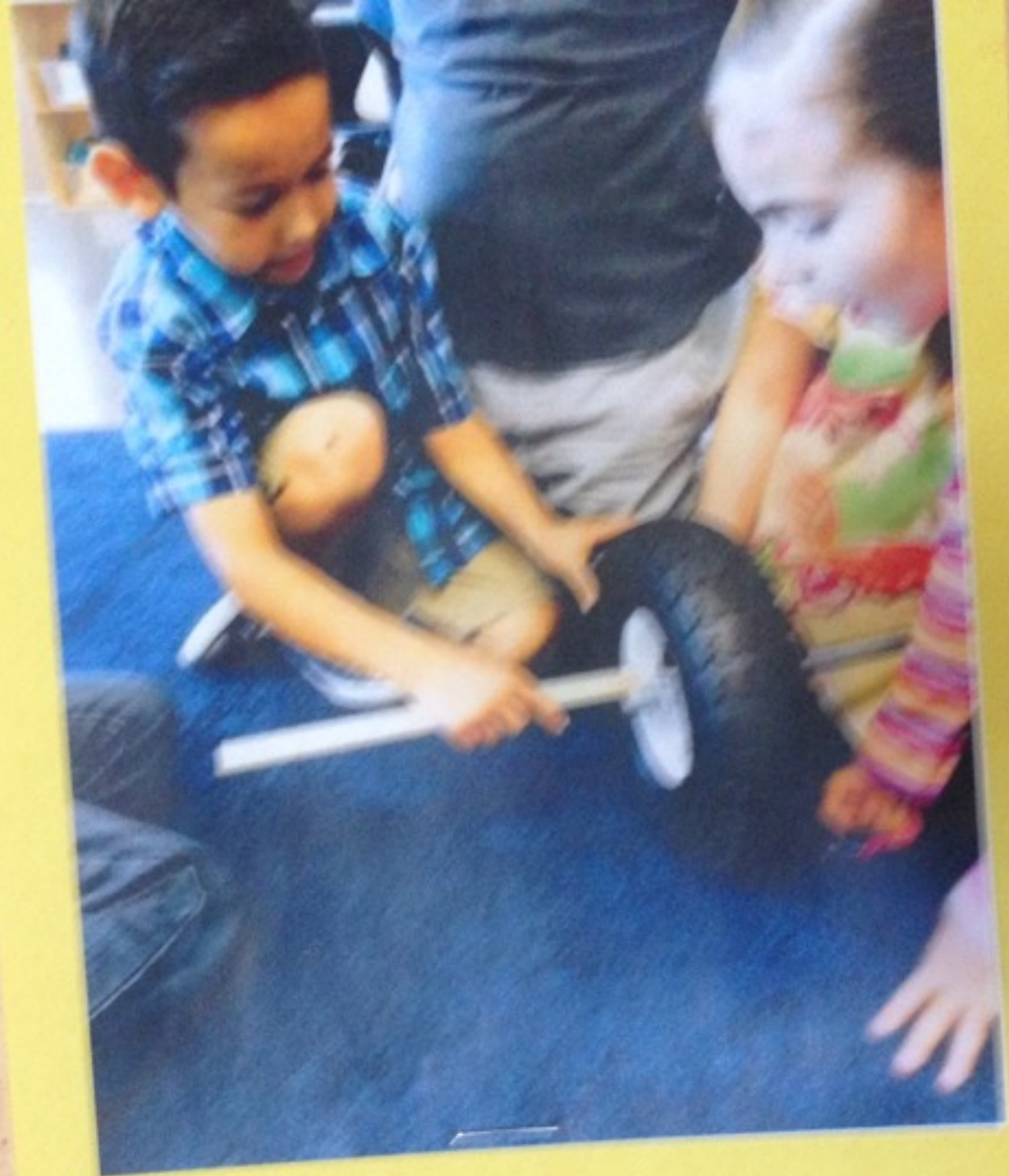






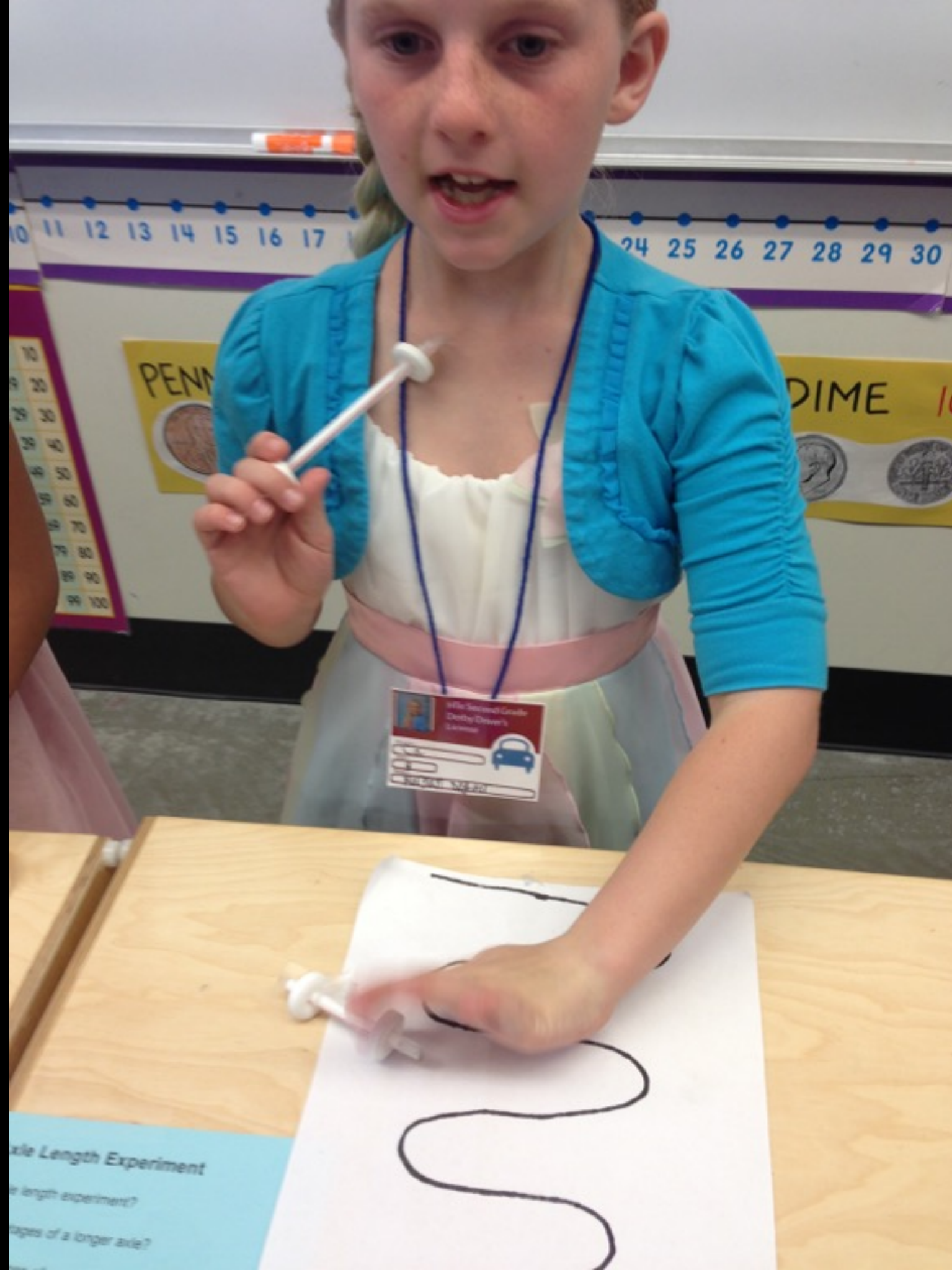












### axle Length Experiment

length experiment?

pages of a longer axle?





# Car Body Rubric

- ① Race Car Feature (number, sponser, design ✓ ~~as~~ ==)
- ② 4 or less colors
- ③ Realistic Car Feature (license plates, headlights, front vent, handle)
- ④ Theme (simple) connected to team name

















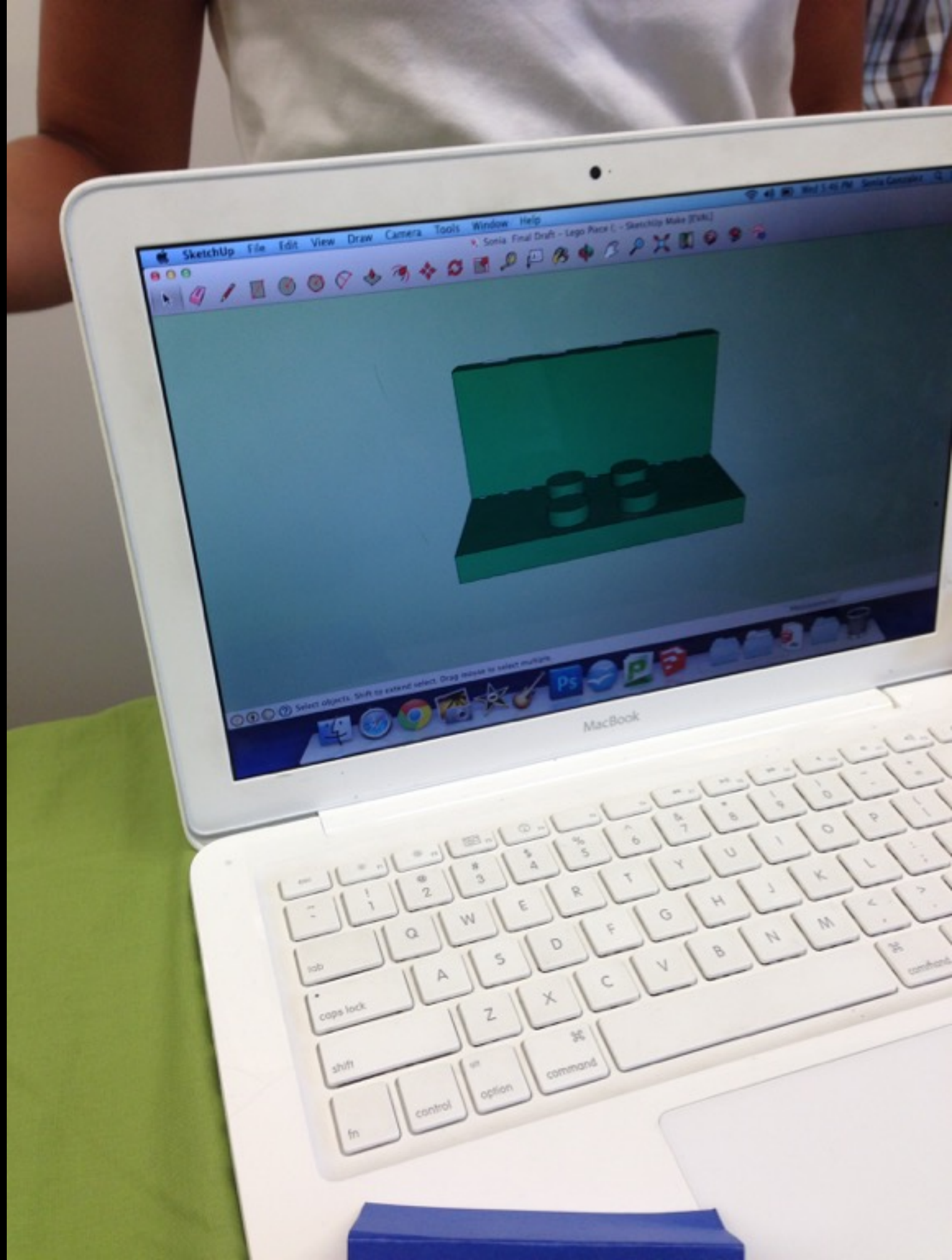
# Space Chasers

Jaddin: Project Manager  
Bryant: Lego Architect  
Cassandra: Lego Piece Engineer  
Gavin: Mechanical Engineer

This ride moves with a motor, gears, and a whole bunch of excitement .  
To make this safe for kids of all ages we had to make this ride slower.  
To do that we started off with a motor underneath the ride connected to the  
we had a 12 teeth gear ,connected to that we had a 24 teeth gear, now we  
go on to the top of the ride we had a 8 teeth gear at the top, and connected  
to that we have a 24 teeth gear, that all comes together and makes the ride  
move slower.

















# *The Monarch Project*

*4th grade blog*

*About*

*Contact*

*Sign Up*

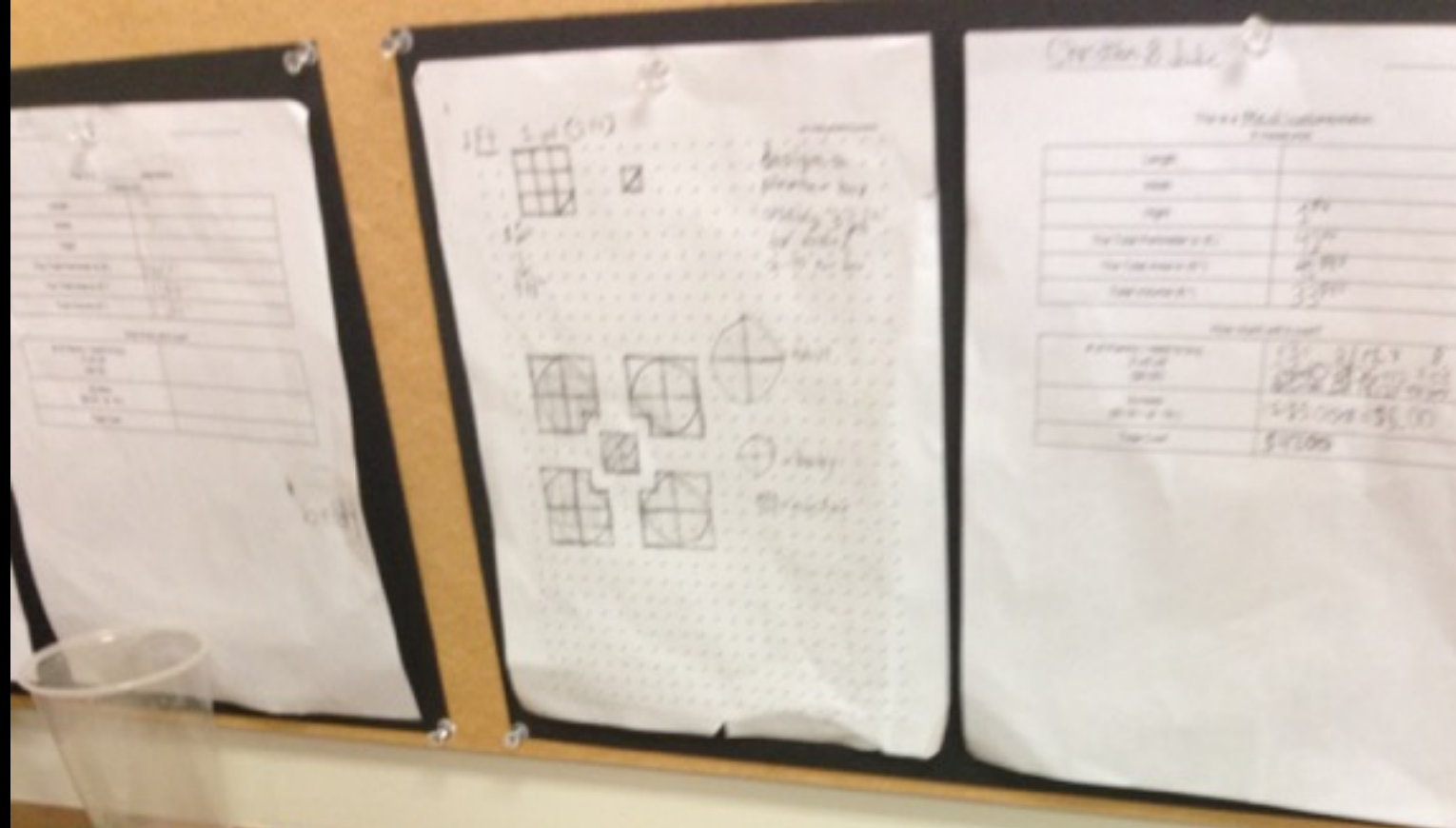


*Tagging*

*Authors*



















# HOST PLANTS

**BY: MADISON, IKER, SEBASTIAN A.**

## What are we doing?

- We are cutting down milkweed pods and collecting the milkweed seeds.
- We are also doing research on the stem, seeds, leaf, and the flower to identify plants.
- The last thing that we have been doing is looking for drought resistant plants. We live in agricultural zone 10, which is the climate Zone in San Diego, California.

## Why Are We Doing This?

We are doing this to protect monarch butterflies, monarch caterpillars and to stop the milkweed population from getting out of control. We are also doing this because it is our contribution to our Cal Poly research by identifying milkweed plants within our Monarch Waystation.







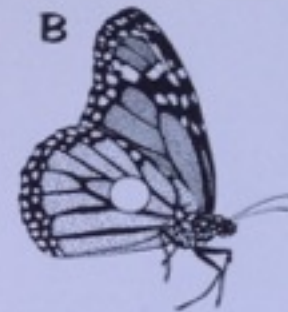
**First**, You have to have your supplies: a butterfly net, butterfly Tags and a data Sheet and a pencil ready to go.



**Second**, grab the butterfly net and try to catch a butterfly. When you catch the butterfly take it to a table or a flat surface.



**Third**, carefully hold the butterfly with your thumb and index finger, making sure to hold both wings. Then grab the tag and put it on the "mitten" on the wing and hold the tag for 10 seconds so that it won't fall off.



**Last**, before you let it go, make sure to record the tag number and the other information on the data sheet. If it hasn't been tested for the O.E. parasite, then send it to the O.E. Group.



**Finally**, we let the butterfly go very gently. After our data sheet is complete, we sent it to Cal Poly.















# Making Connections









Mentions

Conversation



**galaxyinvader**

3 days

@Cmdr\_Hadfield awesome, looking forward to it, love the power of Twitter!



**Cmdr\_Hadfield**

3 days

@galaxyinvader - yes, using the ham radio on ISS, Roman, Tom & I will be the trio onboard when we speak with Mt Ousley School in March!



**galaxyinvader**

3 days

@Cmdr\_Hadfield Hi from Mt Ousley School, Australia. We have ARISS radio contact with ISS Mar 11-18. Will your team be who we are talking to?



**Cmdr\_Hadfield**

5 days

Deep-frying turkey on the left, Russian Orthodox on the right. Welcome to the International Space Station program :) [pic.twitter.com/NO1hsDGN](http://pic.twitter.com/NO1hsDGN)















# Scientists in Schools

HOME

GET INVOLVED

CURRENT PARTNERSHIPS

RESOURCES FOR PARTNERS

DOWNLOAD

CONTACT US



Scientists and Mathematicians  
in Schools also includes

[Mathematicians in Schools](#)

## Scientists in Schools welcomes you...

Scientists and Mathematicians in Schools is a national program that creates and supports long-term partnerships between primary or secondary school teachers and scientists or mathematicians. Partnerships are flexible to allow for a style and level of involvement that suits each participant. Check out the [showcases](#) to see what some partnerships have been doing.

### Scientists

[Information](#) | [Register](#)

### Teachers

[Information](#) | [Register](#)

[Follow @CSIROSMIS](#)

We asked CSIRO: scientists in schools



0:00 / 1:49

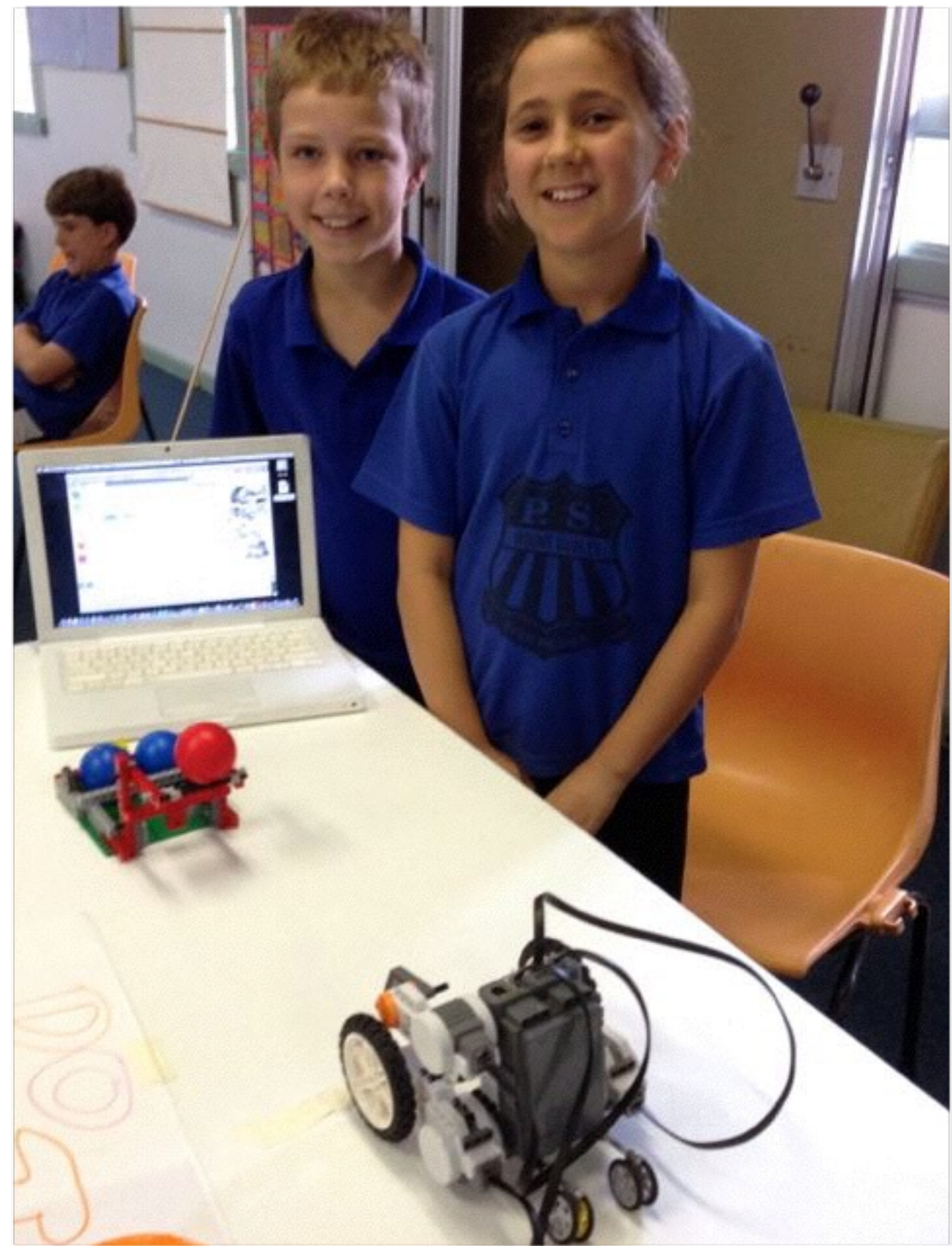
YouTube



STEM Delivery

















# GRAIL MoonKAM



Presented By Marlena Holderness







## Integrated vs Outreach?

Project based learning  
Targeted subjects  
Integrated content

Targets all students  
hook them young!

Easier in primary than  
secondary?

After school  
Workshops  
Lunch clubs  
Gifted & Talented?

Caters for kids already  
hooked on STEM?





Genius Time?

# Ideas lead to a *quality question*!

Trees - How do trees produce oxygen?

Cakes - How to bake a cake, demonstration.

Sharks - What is the diet of a white shark?

London - What should visitors see?

POLAIR - How does POLAIR help rescue people?

DNA - Why do humans have unique DNA?

Parkinsons Disease - How does it affect the body?



# Syllabus Outcomes?

# Syllabus Outcomes?

## Early Stage 1 – Stage 3 outcomes

### A student:

STe-1VA, ST1-1VA, ST2-1VA, ST3-1VA shows interest in and enthusiasm for science and technology, responding to their curiosity, questions and perceived needs, wants and opportunities

STe-2VA, ST1-2VA, ST2-2VA, ST3-2VA demonstrates a willingness to engage responsibly with local, national and global issues relevant to their lives, and to shaping sustainable futures

STe-3VA, ST1-3VA, ST2-3VA, ST3-3VA develops informed attitudes about the current and future use and influence of science and technology based on reason



# Syllabus Outcomes?

# Syllabus Outcomes?

## Objective

Students:

- develop knowledge, understanding of and skills in applying the processes of Working Technologically

### Early Stage 1 outcome

A student:

STe-5WT uses a simple design process to produce solutions with identified purposes

### Stage 1 outcome

A student:

ST1-5WT uses a structured design process, everyday tools, materials, equipment and techniques to produce solutions that respond to identified needs and wants

### Stage 2 outcome

A student:

ST2-5WT applies a design process and uses a range of tools, equipment, materials and techniques to produce solutions that address specific design criteria

### Stage 3 outcome

A student:

ST3-5WT plans and implements a design process, selecting a range of tools, equipment, materials and techniques to produce solutions that address the design criteria and identified constraints

# Syllabus Outcomes?



# Syllabus Outcomes?

## SPEAKING AND LISTENING (COMMUNICATING)

### Stage 1 outcomes

**A student:**

- communicates with a range of people in informal and guided activities demonstrating interaction skills and considers how own communication is adjusted in different situations

EN1-1A

### Stage 2 outcomes

**A student:**

- communicates in a range of informal and formal contexts by adopting a range of roles in group, classroom, school and community contexts

EN2-1A

### Stage 3 outcomes

**A student:**

- communicates effectively for a variety of audiences and purposes using increasingly challenging topics, ideas, issues and language forms and features

EN3-1A

# Syllabus Outcomes?

## OBJECTIVE E

Through responding to and composing a wide range of texts and through the close study of texts, students will develop knowledge, understanding and skills in order to:

- E. learn and reflect on their learning through their study of English

Stage 1 outcomes	Stage 2 outcomes	Stage 3 outcomes
<b>A student:</b>	<b>A student:</b>	<b>A student:</b>
<ul style="list-style-type: none"><li>› identifies and discusses aspects of their own and others' learning EN1-12E</li></ul>	<ul style="list-style-type: none"><li>› recognises and uses an increasing range of strategies to reflect on their own and others' learning EN2-12E</li></ul>	<ul style="list-style-type: none"><li>› recognises, reflects on and assesses their strengths as a learner EN3-9E</li></ul>

# Syllabus Outcomes?

## OBJECTIVE E

Through responding to and composing a wide range of texts and through the close study of texts, students will develop knowledge, understanding and skills in order to:

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◀	<b>Stage 1 outcomes</b>  <b>A student:</b>	<b>Stage 2 outcomes</b>  <b>A student:</b>	<b>Stage 3 outcomes</b>  <b>A student:</b>	▶
	<b>&gt; identifies and discusses aspects of their own and others' learning</b> EN1-12E	<b>&gt; recognises and uses an increasing range of strategies to reflect on their own and others' learning</b> EN2-12E	<b>&gt; recognises, reflects on and assesses their strengths as a learner</b> EN3-9E	



Keeping them honest!

## Genius Hour Starter Questions

[illegible]

Name\_\_\_\_\_

Genius Hour Term 3 <u>Topic</u>	
Guiding Question	
Milestone Week 2 – 25 July ( <u>topic</u> identified, sources identified)	
Milestone Week 3 – Research evident (min 1 pages notes + artefacts) Presentation style identified (play, keynote, iMovie, made)	
Milestone Week 5 Research complete Final product commenced	
Milestone Week 7 Final product more than 50% complete, clearly state what finished product will look like	
Presentation to class Week 9 Peer and teacher reviewed	



## Mt Ousley PS Genius Hour Rubric Years

Score Levels	Question	Conventions	Presentation	Connections
4	<ul style="list-style-type: none"> <li>Is well thought out and supports a clearly defined question</li> <li>Reflects extensive use of Bloom's Taxonomy</li> </ul>	<ul style="list-style-type: none"> <li>None or limited spelling, grammatical, or punctuation errors</li> </ul>	<ul style="list-style-type: none"> <li>Presentation captures audience attention</li> <li>Multiple uses of multimedia though e.g. <u>Prezi</u>, blogs, movies, quizzes, iBooks</li> </ul>	<ul style="list-style-type: none"> <li>Use of email, Skype and connections with more than one expert</li> </ul>
3	<ul style="list-style-type: none"> <li>Is well thought out and supports a question</li> <li>Has a moderate use of Bloom's Taxonomy</li> </ul>	<ul style="list-style-type: none"> <li>A few (1-4) spelling, grammatical, or punctuation errors</li> </ul>	<ul style="list-style-type: none"> <li>Presentation is well organized</li> <li>More than 2 forms of multimedia used</li> </ul>	<ul style="list-style-type: none"> <li>Use real world connections including Skype and email</li> </ul>
2	<ul style="list-style-type: none"> <li>Provides some information</li> <li>Shows some use of Blooms Taxonomy at lower levels</li> <li>Has no clear goal</li> </ul>	<ul style="list-style-type: none"> <li>Some spelling, grammatical, or punctuation errors</li> <li>Low-level use of vocabulary and word choice</li> </ul>	<ul style="list-style-type: none"> <li>Project has a focus but might stray from it at times</li> <li>Presentation does not capture audience attention</li> </ul>	<ul style="list-style-type: none"> <li>Use of Internet and books</li> </ul>
1	<ul style="list-style-type: none"> <li>Provides weak information</li> <li>Has significant factual errors or ideas</li> </ul>	<ul style="list-style-type: none"> <li>Many spelling, grammatical, or punctuation errors</li> <li>Poor use of vocabulary and word choice</li> </ul>	<ul style="list-style-type: none"> <li>Content is poorly organized</li> <li>Presentation has no clear organization</li> </ul>	<ul style="list-style-type: none"> <li>Use of books only</li> </ul>



# Novel Engineering







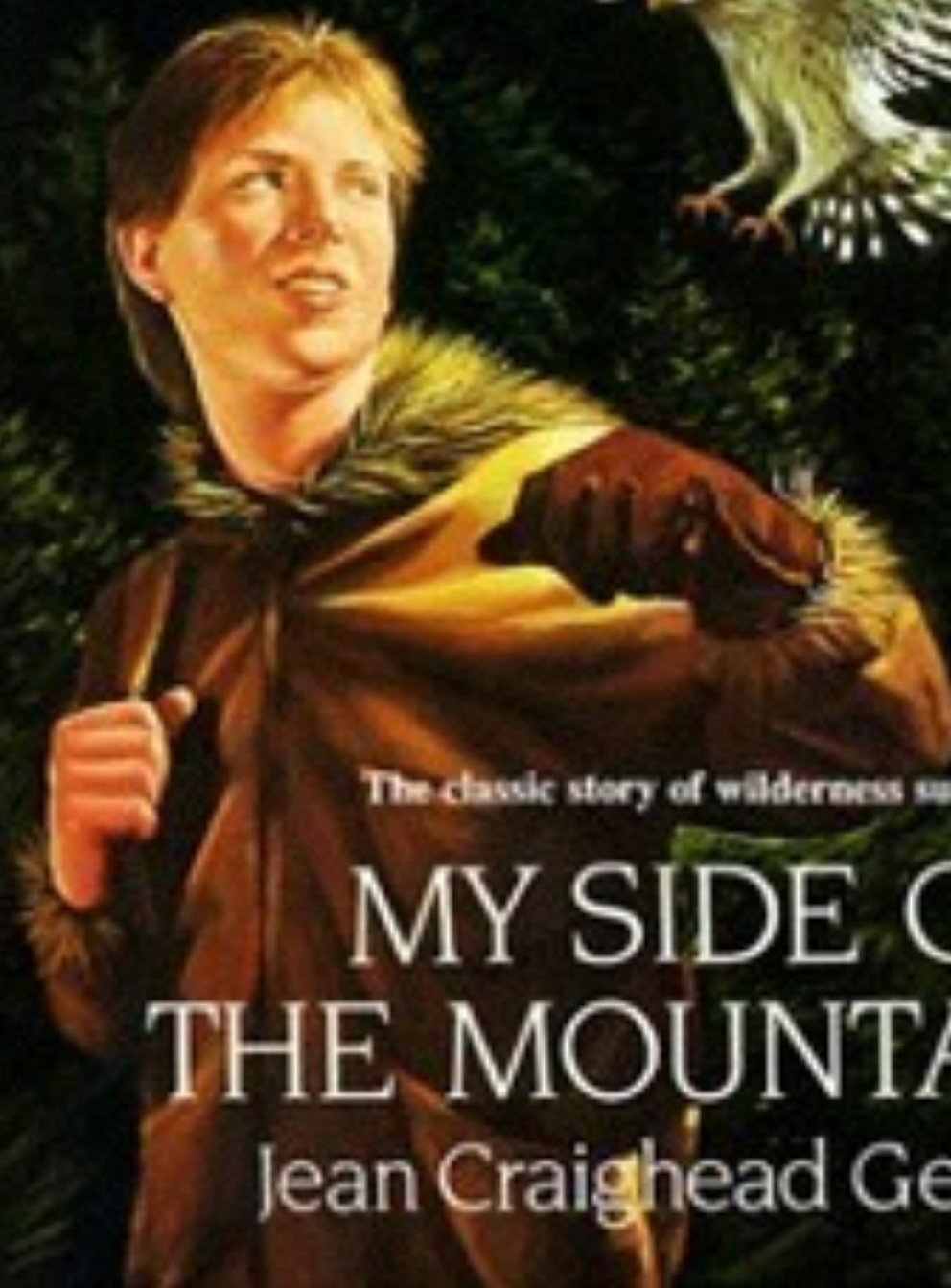
Inspired by kids and grounded in research, Novel Engineering is an innovative approach to integrate engineering and literacy in elementary and middle school.

Students use classroom literature—stories, novels, and expository texts—as basis for engineering design challenges to:

- Identify engineering problems
- Impose constraints by using details from the text
- Design functional, realistic solutions for characters
- Engage in the Engineering Design Process while reinforcing their literacy skills

[Learn more](#)[See Links to Common Core](#)[Upcoming Workshops](#)[Follow](#)

A PUFFIN BOOK



The classic story of wilderness survival

# MY SIDE OF THE MOUNTAIN

Jean Craighead George



















# Tinkering K-6

ideas and examples

Mount Ousley Public School







Australian Government

Chief Scientist

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SEPTEMBER 2014



# Makerspaces/Tinkering

# Invent To Learn

Making, Tinkering, and Engineering in the Classroom

[About the book](#)

[Buy the book](#)

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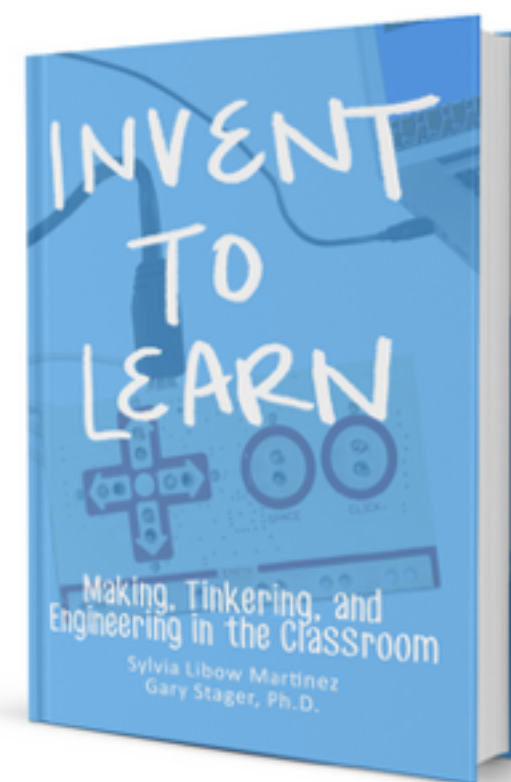
[CMK Press](#)

# Invent To Learn

## Making, Tinkering, and Engineering in the Classroom

By Sylvia Libow Martinez & Gary Stager

Using technology to make, repair, or customize the things we need brings engineering, design, and computer science to the masses. Fortunately for educators, this maker movement overlaps with the natural inclinations of children and the power of learning by doing.



# the tinkering studio™

Experiments with science, art, technology, and delightful ideas.



## Featured Project Digital Bling

LEDs, wires, coin-cell batteries and switches are electronic components that can be tinkered in different ways. There's no better way to get the most out of these materials than creating beautiful wearables.

See all from

- ☐ circuits
- ☐ hare-brained ideas
- ☐ light and shadow

The Tinkering Studio is primarily an R&D laboratory on the floor of the Exploratorium, but whenever possible we try to share our activities, and developing ideas following an "open source" model. Learn how you too can enjoy our activities in your kitchen, classroom, and community.



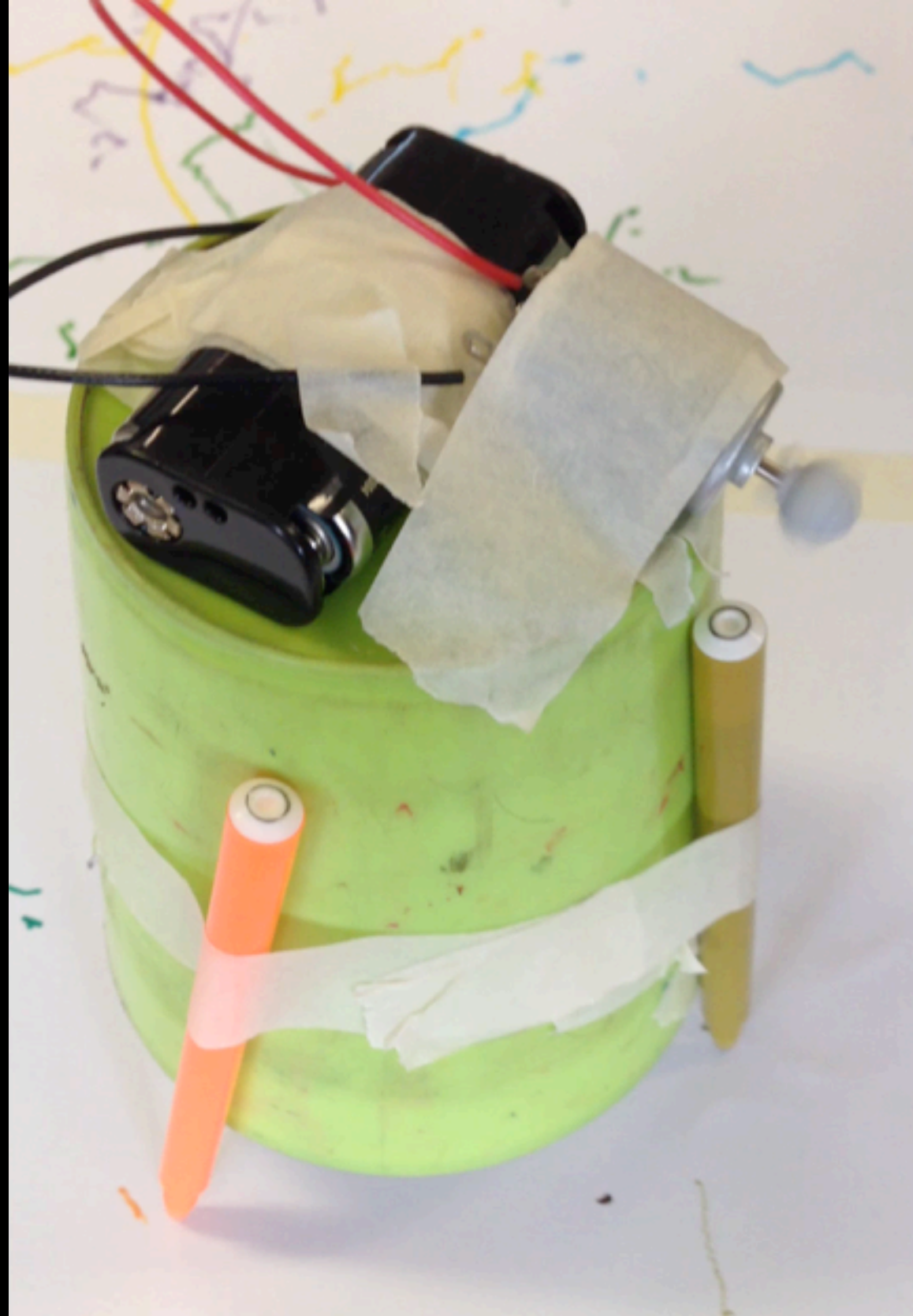


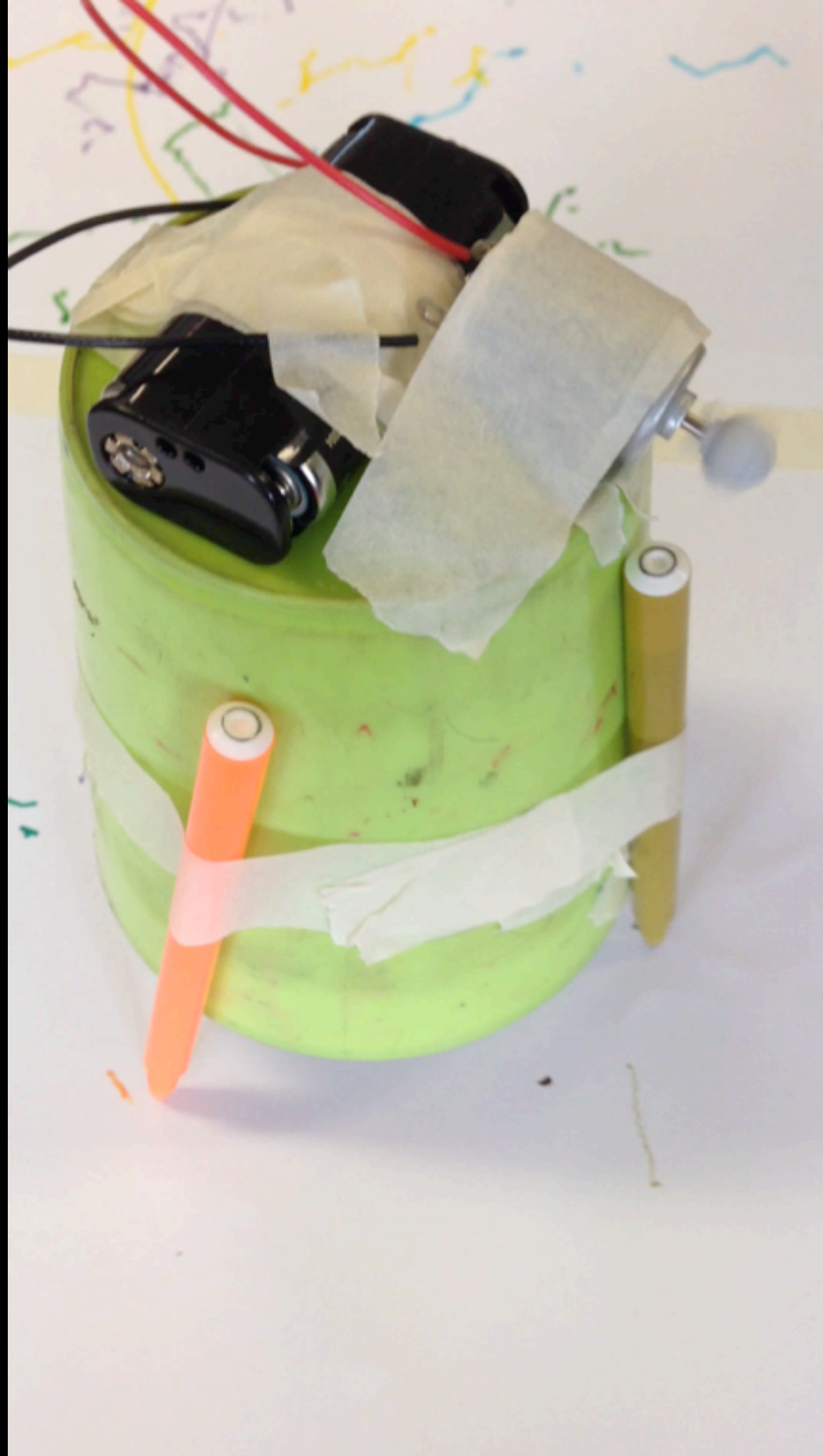












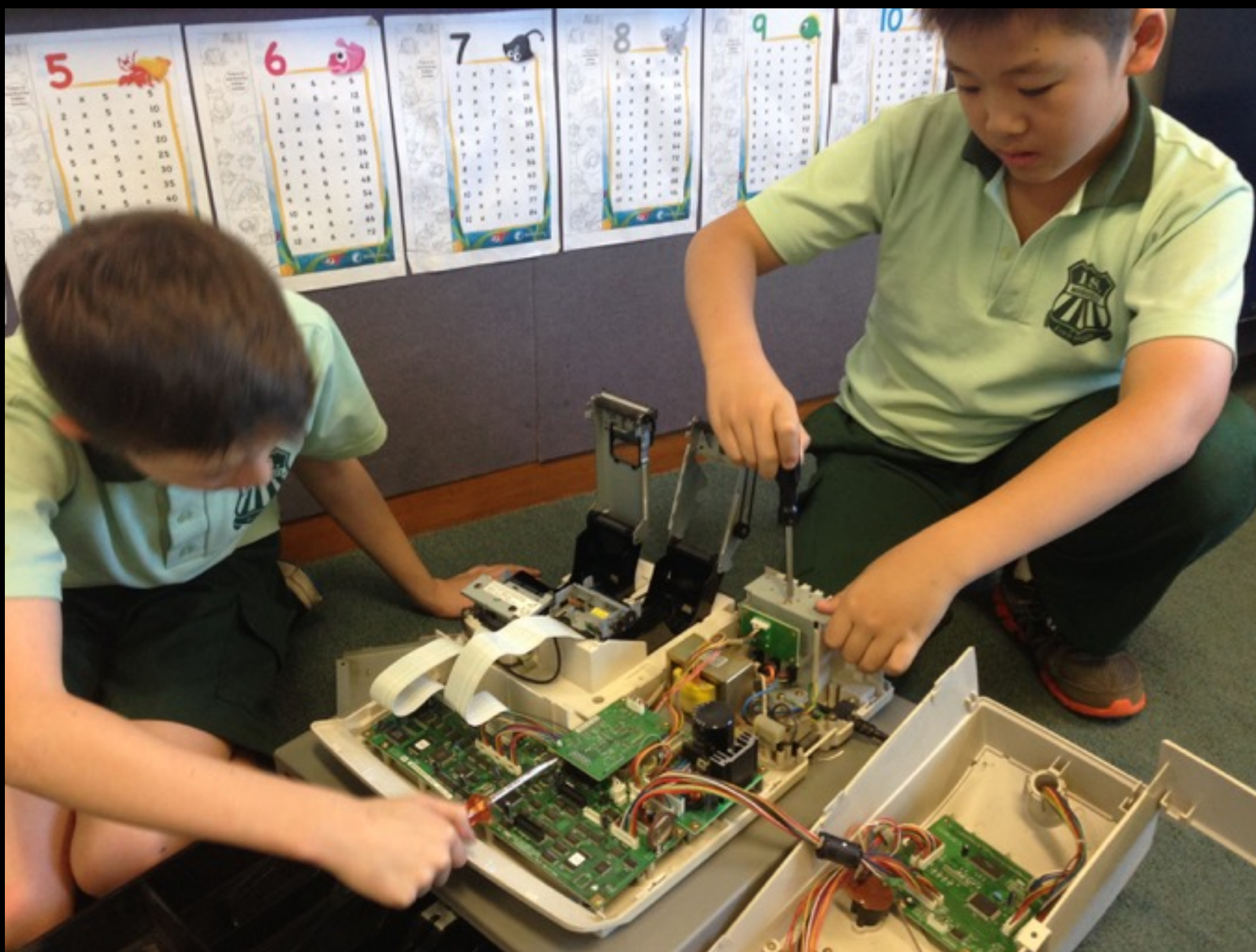






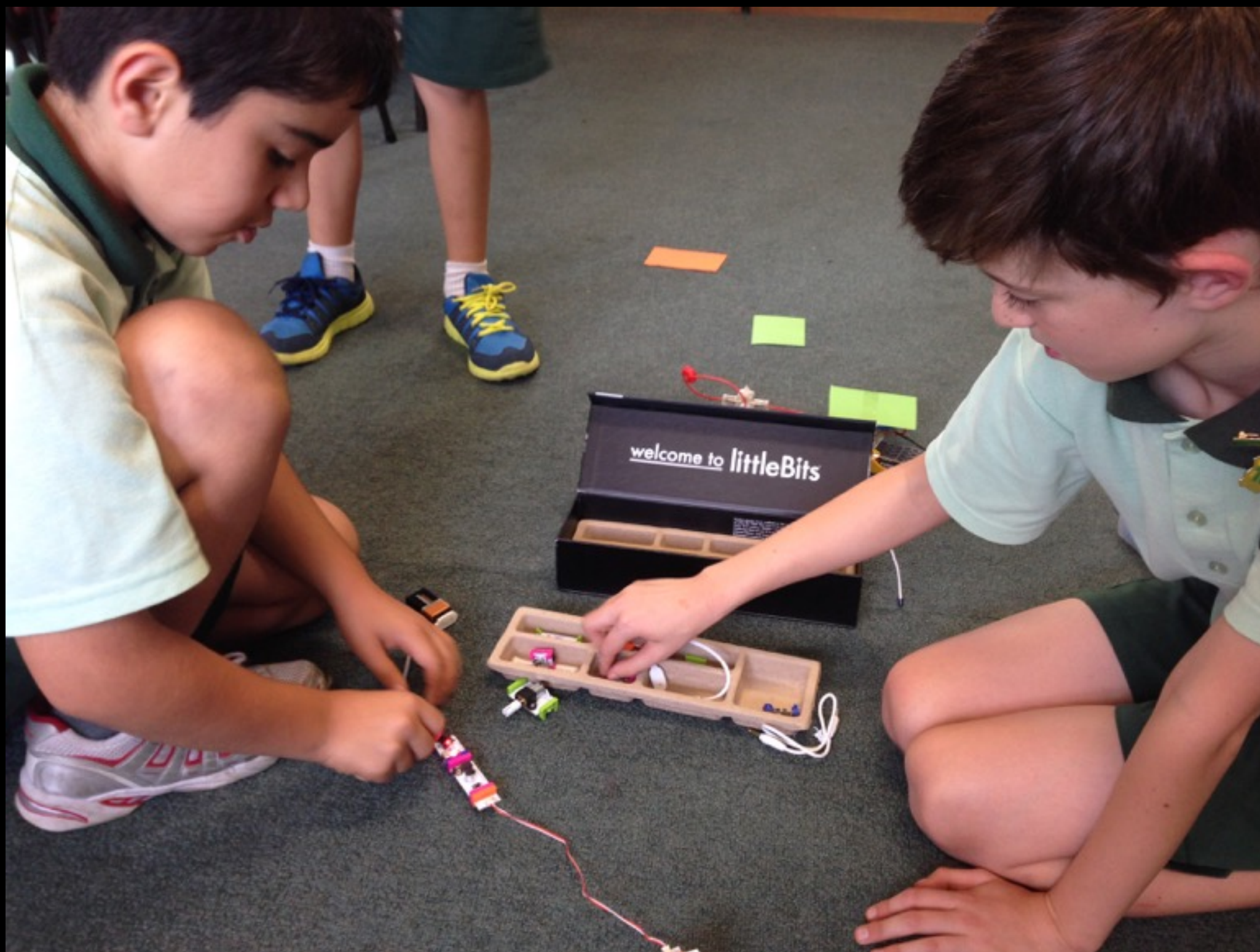








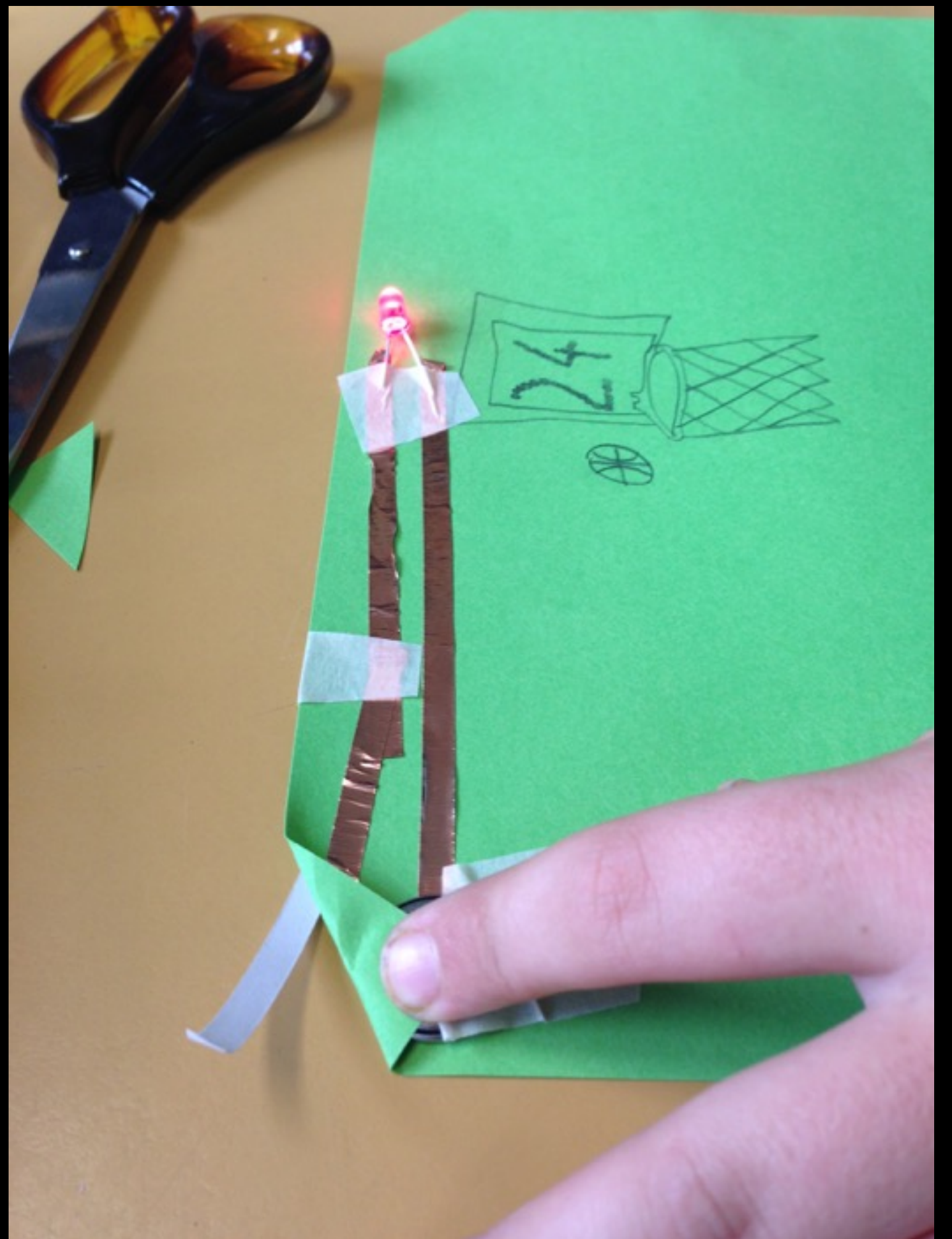




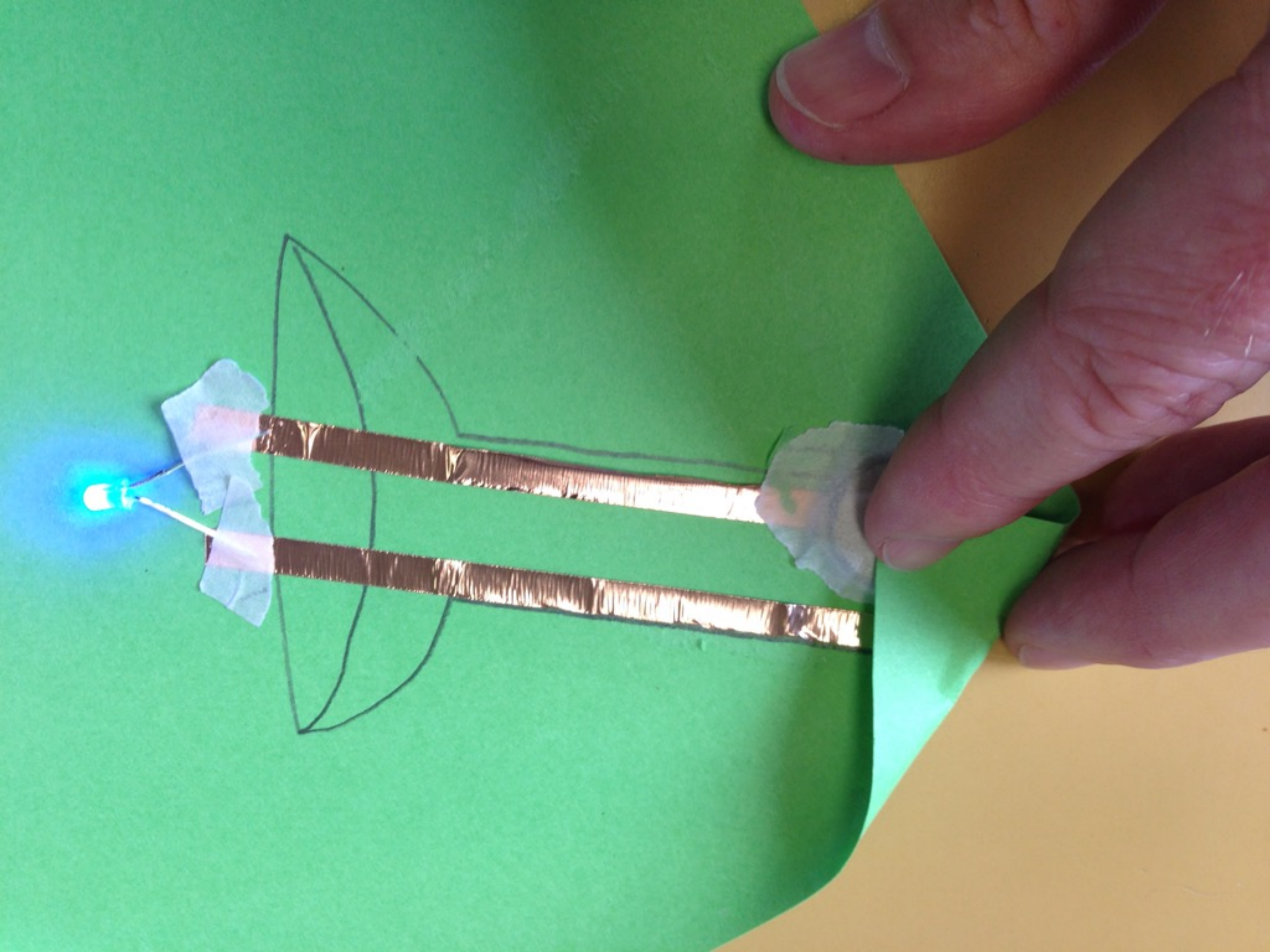


















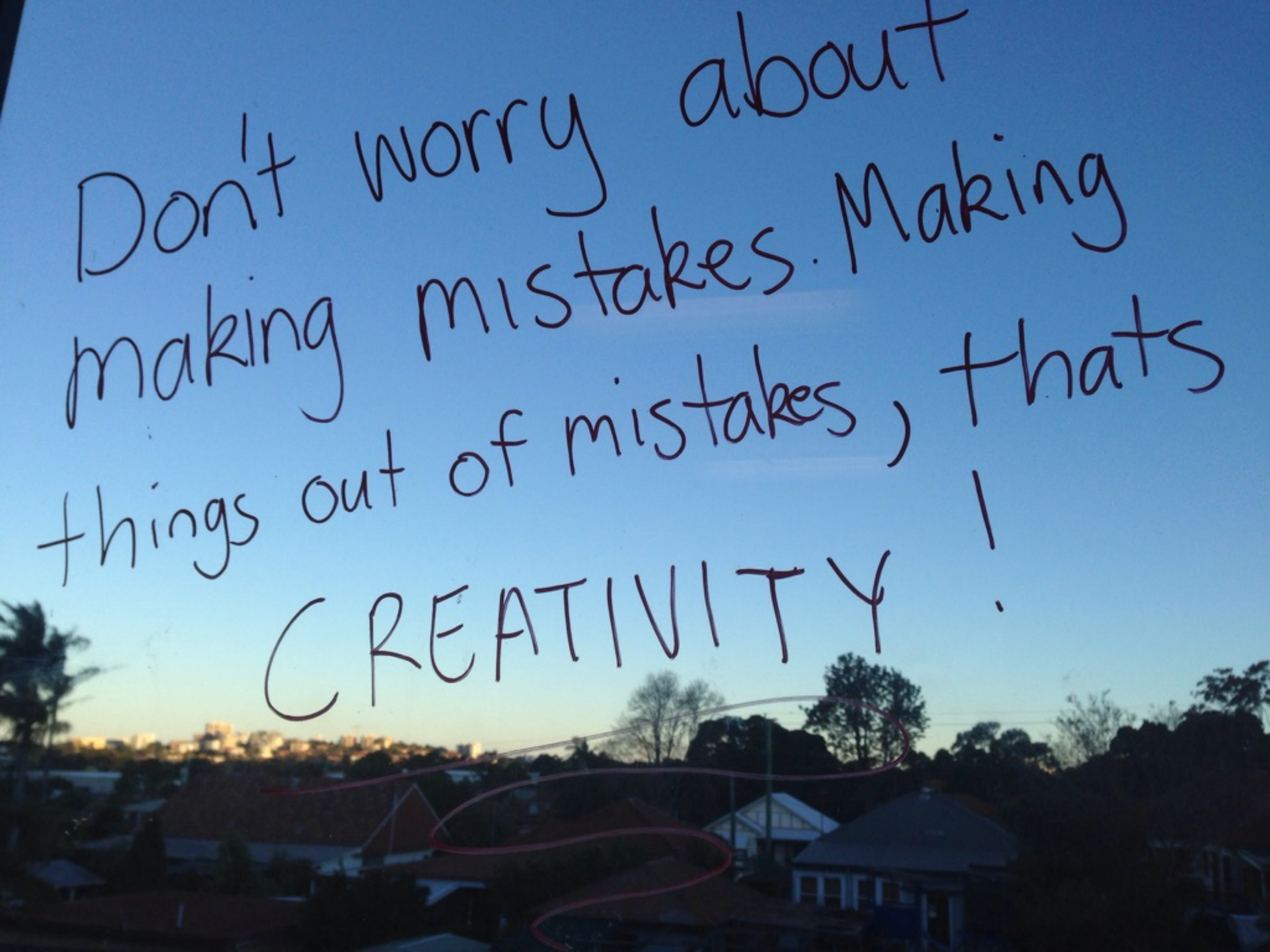
HIGH TECH ELEMENTARY

# **The Hive**

## **Unorthodox Teaching Design & Brainstorming**

**Room 153**





Don't worry about  
making mistakes. Making  
things out of mistakes, that's

CREATIVITY!





Mount Ousley Public School

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