

Environment

Portfolio summary

In this portfolio, students show that they can design questions for investigation using appropriate inquiry skills. They systematically record and tabulate data, analyse trends in collected data and summarise findings of a survey. Students draw conclusions from their results and discuss potential consequences of them.

Students use effective project planning techniques for a designed solution. They outline a research plan, design criteria and success criteria. Students explain the need for a designed solution, using photographic evidence and survey results. They demonstrate research into a range of options and provide a number of preliminary sketches before deciding on the solution. They are able to justify their designed solution. Students prepare an implementation plan. They make effective use of technologies.

Students use scale and scale factor to calculate area. They plan, budget and cost an event and use efficient strategies to calculate profit and loss. They cost the design choice and justify the cost.

This portfolio has its basis in Technologies with Mathematics and Science playing secondary roles.

Design project: The top playground

Sample summary

This task is the culmination of an extended unit of work that aimed to make connections for students between STEM disciplines in a project that targeted an identified need in the school. Students collaborated in small groups to investigate the effect of overpopulation on the school's top playground. They were asked to design a potential solution to address the identified problems, using their knowledge of the design process and mathematical, technological and scientific tools.

Achievement Standards

Science

Technologies

Mathematics

By the end of Year 9, students explain chemical processes and natural radioactivity in terms of atoms and energy transfers and describe examples of important chemical reactions. They describe models of energy transfer and apply these to explain phenomena. They explain global features and events in terms of geological processes and timescales. They analyse how biological systems function and respond to external changes with reference to interdependencies, energy transfers and flows of matter. They describe social and technological factors that have influenced scientific developments and predict how future applications of science and technology may affect people's lives.

Students design questions that can be investigated using a range of inquiry skills. They design methods that include the control and accurate measurement of variables and systematic collection of data and describe

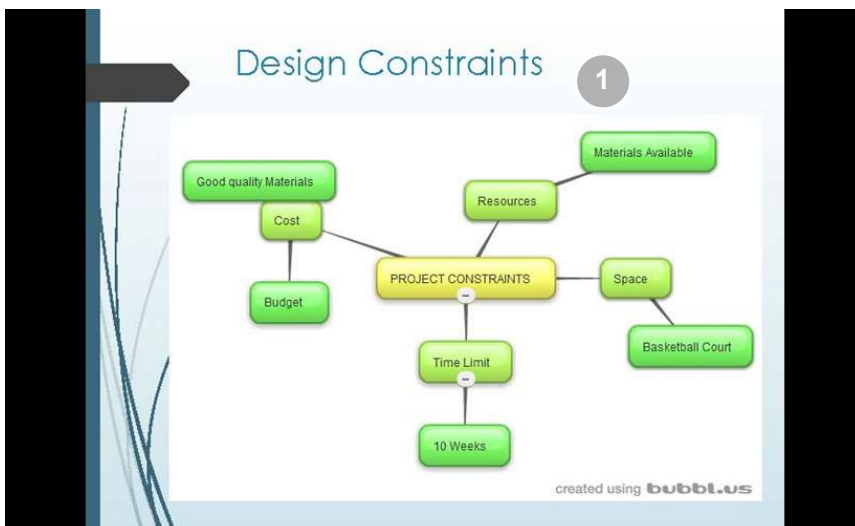
how they considered ethics and safety. They analyse trends in data, identify relationships between variables and reveal inconsistencies in results. They analyse their methods and the quality of their data, and explain specific actions to improve the quality of their evidence. They evaluate others' methods and explanations from a scientific perspective and use appropriate language and representations when communicating their findings and ideas to specific audiences.

Project folio



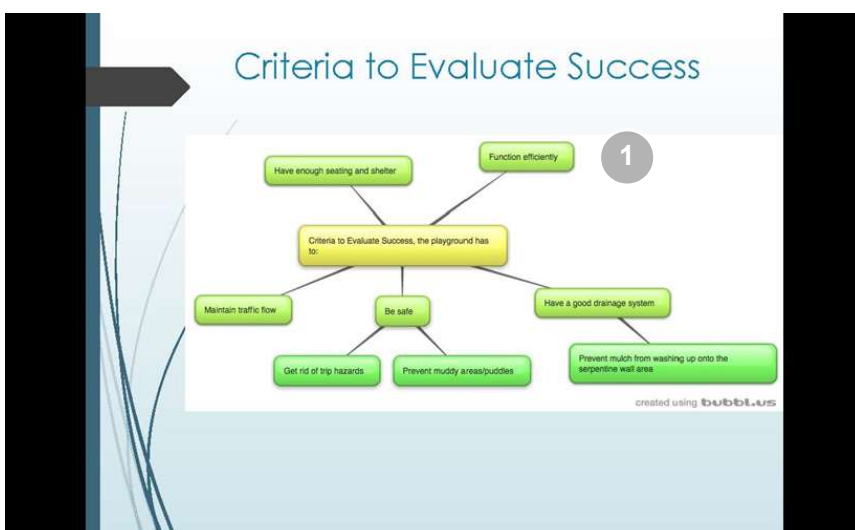
Annotations

1 **Technologies**
 Outlines research plan for the project



Annotations

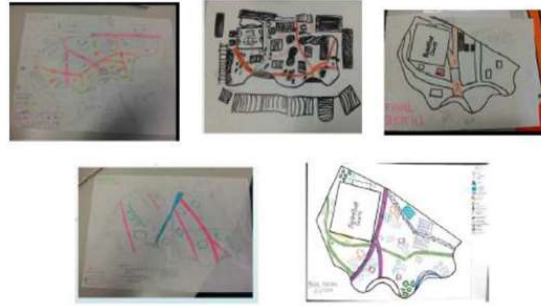
1 **Technologies**
 Considers important design constraints



Annotations

1 **Technologies**
 Identifies key success criteria

IDEA DEVELOPMENT 1

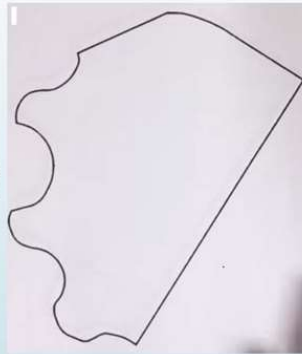


Annotations

- 1 **Technologies**
Sketches four possible design ideas before deciding on final designed solution

Area of Top Playground 1

- Scale:
- 16.7cm -----105.62m
- 1 cm-----6.33m
- 1cm squared -----40cm squared
- = 152.27 (area of playground using composite shaped) x 40
- =6050.8 m squared



Annotations

- 1 **Mathematics**
Uses scale and scale factor to approximate area

Research Our Survey Results

These are the most popular answers we received from the students we surveyed

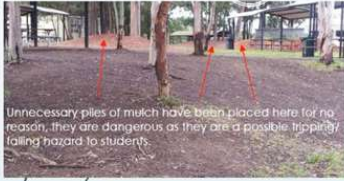
<p>What do you like about the top playground? The space, Nothing</p>	<p>Do you use the paths available on the top playground? 29% Sometimes 35% Yes 36% No</p>
<p>What do you dislike about the top playground? Dirt and dust, Overcrowded, Lack of shelter</p>	<p>Are there enough sheltered areas in the top playground? 21% Yes 79% No</p>
<p>The top playground is: Average</p>	<p>Are there enough benches in the top playground? 92% No 8% Yes</p>
<p>What do you want in the top playground? More shelter, More bins, Bubbler, Better Drainage</p>	

Annotations

- 1 **Mathematics**
Summarises key findings of the survey

IMAGES OF THE TOP PLAYGROUND

1



Annotations

- 1 **Technologies**
Explains the need for a designed solution and provides photographic evidence

Soil Testing

1

- 1. Sample 1 : Near the mulch piles

pH - 5
Texture - Loamy sand

- 1. Sample 2: Near the outdoor learning center

pH - 5
Texture - Claylike sand

CONCLUSION:
Plants are unable to grow in the top playground



Annotations

- 1 **Science**
Uses soil testing results to reach a conclusion

Cost Research

1

1. BENCHES				
TYPE	SIZE (mm)	PRICE EACH (\$)	QUANTITY	COMPANY
Curved steel Seat	Custom made	2,250	3	1
Aluminium bench 1 (Inground)	2000	260	10	2
Aluminium bench 2 (Inground)	1800	260	10	3

2. SYNTHETIC GRASS			
TYPE	HEIGHT (MM)	PRICE per sqm (\$)	COMPANY
Type 1	40	31.99	1
Type 2	35	38.62	2
Type 3	44	33.19	3

3. SHELTERS				
TYPE	MEASUREMENTS (MM)	PRICE EACH (\$)	QUANTITY	COMPANY
Type 1	6250 x 4150 x 5100	21,624	2	1
Type 2	2400 x 1960 x 1800	3,950	3	2
Type 3	Shelter size: 2500 x 2500; Table setting: 1800	3,905	3	3

4. CONCRETE PATHS		
TYPE	PRICE per sqm	COMPANY
Concrete	\$290	1
Concrete	\$300	2

Annotations

- 1 **Mathematics**
Shows evidence of costing a variety of equipment and materials from a range of sources

TOTAL COST:

1

Benches:

1. Aluminium Benches -- 10 -- **\$2,600**
2. Curved Steel seat -- 3 -- **\$6,750**

Shelters:

1. Type 1 --2 -- **\$21,624**
2. Type 3 -- 2 -- **\$7,810**

Concrete Paths:

1. Path 1 -- 103m x 1.8m = 185.4 sqm -- **\$53,776**
2. Path 2 -- 63.8m x 1.8m = 114.84 sqm -- **\$33,303.60**

Artificial Grass:

1. Type 3 -- 4677.5 sqm -- **\$155,246.23**

TOTAL: \$281,109.83

Annotations

- 1 **Mathematics**
Calculates total cost of project correctly

Athletics Carnival Financials

1

In order to raise funds, we decided to sell a variety of food and drinks at the CTHS Athletics Carnival

Item	Cost Price each	Amount Purchased	Total Cost	Selling Price	Profit/Item	Total Profit
Check Tickets	\$0.50	4	\$2.00	\$-	-\$0.50	-\$2.00
Sausage/Bread	\$0.50	700	\$350.00	\$2.50	\$2.00	\$1,400.00
Bread	\$1.75	40	\$70.00		\$-	\$-
Onions			\$14.10		\$-	\$-
Chilies	\$0.00	160	\$120.00	\$2.00	\$1.20	\$190.00
Peas	\$0.60	100	\$60.00	\$1.50	\$0.90	\$90.00
Ice Blocks	\$0.15	320	\$48.00	\$1.00	\$0.85	\$272.00
Water	\$0.20	85	\$17.00	\$2.00	\$1.71	\$164.16
Drink cans type 1	\$0.60	144	\$86.40	\$2.00	\$1.42	\$204.48
Drink cans type 2	\$0.55	200	\$110.00	\$2.00	\$1.45	\$290.00
Drink cans type 3	\$0.60	450	\$270.00	\$2.00	\$1.34	\$611.04
Sauce			\$25.30		\$-	\$-
Nachos			\$10.00		\$-	\$-
Bag			\$3.00		\$-	\$-
Cup			\$2.25		\$-	\$-
Paper			\$4.00		\$-	\$-
Paper Towels			\$1.50		\$-	\$-
Chocolate type 1	\$1.00	24	\$24.00	\$2.00	\$1.00	\$24.00
Chocolate type 2	\$1.00	38	\$38.00			
Chocolate type 3	\$1.30	35	\$45.50			
Jam Bar Donuts	\$0.50	36	\$18.00			
Cinnamon Donuts	\$0.33	86	\$28.38			
Athletics Sticks			\$110.00			
Drink cans type 4	\$0.50	160	\$80.00			
TOTALS			COST: \$1581.04			PROFIT: \$3,862.84

Annotations

- 1 **Mathematics**
Uses a table to compare cost, selling price and profit per item

Athletics Carnival STEM Funding

Profit: **\$3662.64**

1

How much it cost us: **\$1581.04**

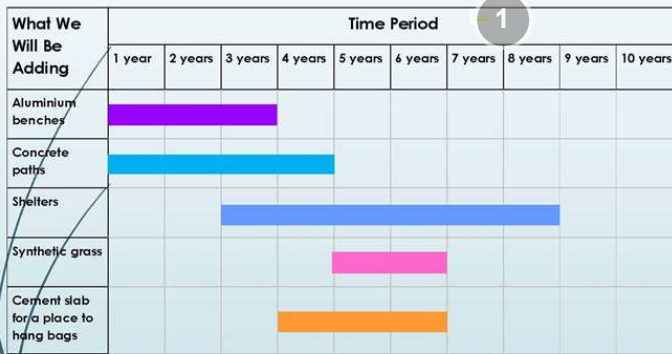
Total price we sold the food and drinks for: **\$5243.68**



Annotations

- 1 **Mathematics**
Calculates profit correctly

Implementation Time Plan



Annotations

- 1 **Technologies**
Uses a Gantt chart to show stages of implementation

TPGR Our Final Proposal

1. Concrete Paths 1

We are going to add a few more paths where the main highways so people don't get their shoes muddy when it rains.

Adding footpaths would cut down the dust that gets kicked up therefore creating a more friendly environment for children to learn and grow.

Annotations

- 1 **Technologies**
Justifies design decision

2. Shelters 1

- Details**
- Curved roofs
 - Broad roofs

It would take approximately 6 years to install all the shelters we are planning to add.



TYPE	MEASUREMENTS (mm)	PRICE EACH (\$)	
Type 1	6250 x 4150 x 5100	21,624	2
Type 2	2400 x 1960 x 1800	3,950	3
Type 3	Shelter size: 2500 x 2500 Table Setting: 1800	3,905	3



Annotations

- 1 **Mathematics**
States choice of equipment with details of design and cost

3. Seating 1

WE ARE ADDING:

- Metal Benches (in ground)
- Curved Metal Seats (surrounding trees)

HOW LONG WILL THIS TAKE?

1. Metal Benches : 2 Years
2. Curved Metal seats : 1- 1 ½ Years

The seating will be implemented in the first two years over ten year period

ITEM	COST (each)	QUANTITY	MEASUREMENTS
Metal Benches	\$260	10	1.8m x 0.5m
Curved Seats	\$2250	3	Custom Made

Annotations

- 1 Technologies**
Illustrates choice of equipment with projected timeline


4. Artificial Grass 1

Why artificial grass?

- Nice Landscaping
- Covers dust and dirt
- Durable
- Students can sit on the astroturf

HOW LONG WILL THIS TAKE? Over a ten year period, the artificial will be implemented on the **5th - 6 ½ year.**

NAME	COST per sqm	MEASUREMENT S
Type 1 35 mm	\$ 33.19	4677.5 sqm (area of top playground) x \$33.19 = \$ \$155,246.23



Annotations

- 1 Mathematics**
Justifies and costs design choice

5. Bag Hangers 1

Details

- Metal/brass hooks for durability
- Cement slab
- Install near the basketball courts



6. Amphitheatre

The idea of an 'Amphitheatre' in the top playground is to provide general seating but also to allow a space for events such as concerts, presentations and assemblies. It also would act as a retaining wall for the large amount of dirt that collects in the serpentine wall area.



Annotations

- 1 Technologies**
Provides two uncoded designed solutions with some justification for their inclusion

Scientific report

STUDENT TRAFFIC FLOW ASSIGNMENT
GROUP 5
12 March 2015

Abstract: The aim of this experiment was to investigate the traffic flow of students and staff members in the paths from K7 to K14. The experiment was conducted and results prove that the hypothesis was correct, students were walking on the dirt tracks instead of the paths. Therefore, we can conclude that the traffic flow is not efficient at all and it will need a new solution to properly function.

Aim: This experiment aims to investigate the traffic flow of students and staff members in the paths from K7 to K14.

Hypothesis: Most students will walk through the dirt tracks instead of the paths.

Introduction: Over the years, the top playground has not been functioning the way it was designed to be used. Most of the land has been degraded as the grass is unable to grow and dirt tracks are everywhere. The paths aren't used by as much people since most students take the shortest route, even if it means cutting across the basketball court. By studying the student traffic flow, we will be able to pinpoint the right locations to build paths for students and staff to use, so that we can prevent going through the basketball courts or dirt tracks in order to get to class on time.

Experimental method: Our observations were taken at the area behind the basketball courts from K7 to K12 at recess, lunch and in between periods. Using a laptop, the observations were taken down onto a spreadsheet.

Results:

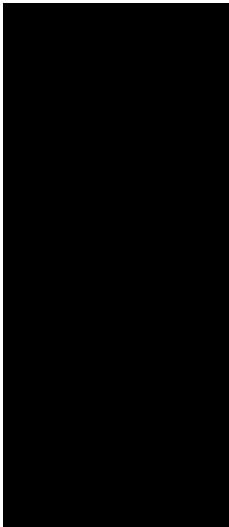
CLASS TRAFFIC FLOW DATA COLLECTED:

Area	1st	2nd	3rd	4th	5th	Average
Back Basketball	54	75	123			84
	P2-Recess	P3-4	P4-Lunch			
K Block	139	176	55			123
			P1-2			

- 1
- 2
- 3

Annotations

- 1 **Science**
Formulates a plausible hypothesis
- 2 **Science**
Explains the motivation for the investigation and how its results will support decision-making
- 3 **Science**
Systematically collects and records data



Woodchips	83	147	132	76	92	105
	P1-2	P2-Recess	Recess-P3	P3-4	P5-6	
Outdoor Learning Space	88	33	11			44
	P4-Lunch	P2-Recess	P2-Recess			
E Block	78					76
	P3-4					
Serpentine Wall	194	147	251	166		180.5
	P5-6	P1-2	P3-4	P3-4		
Dir Path next to Bball Court	31	17				24
	P1-2	Recess-P3				

Discussion: By looking at the results of the amount of students walking behind the basketball court, we learn that almost all of the students walked through the dirt instead of the path. This can bring about many hazards, such as for people that are asthmatic or sensitive to dust, because from the dirt ground, dust can rise up into air. The idea in this report (traffic flow issues in the top playground) has recently become a great problem for our school, and in order to solve it, we need to come up with a solution that ensures for the top playground to be running efficiently while being free from safety risks.

Conclusion: From this experiment we can conclude that the traffic flow wasn't very effective in our area since people were walking around in all directions and weren't using the path.

- 1

Annotations

- 1 **Science**
Draws conclusions from the experimental results and discusses potential consequences to health- and safety-related issues

3D walkthrough



stem env ws1 a3 1280x720 10 1 mbps



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