design challenges: teaching ideas

These design challenges were ideated by a fabulous cohort of Bachelor of Education (Primary) teacher education students in Technology Education

School of Education and Professional Studies, Griffith University, Gold Coast campus
Foreword

This booklet provides a resource for teacher education students built through a collation of many of the design challenges developed by 2nd year Bachelor of Education (Primary) students.

The summaries provided suggest a rich and diverse range of Design Challenges which can be used as a springboard for developing Units of work built upon these ideas.

According to the Queensland Studies Authority, Design Challenges are: “situations, problems or tasks that have a technology demand – that is, they are challenges requiring students to make cognitive and practical responses that draw on their technology knowledge, practices and dispositions.” (QSA, 2003, Technology Initial In-service Materials, p.37)

“Design Challenges allow students to:

- actively participate in designing and developing a range of different design solutions and innovative products
- develop and pursue enterprising initiatives
- draw upon their experiences, creativity and skills, regardless of their gender and cultural background
- develop and demonstrate Technology-related knowledge, practices and dispositions across the strands in different contexts
- work in real-life or lifelike situations where they are designing a product for a ‘real’ want or need.” (QSA, 2003, Technology Initial In-service Materials, p.37)

Importantly, the Technology Key Learning Area in Queensland requires teachers to design learning experiences which enable their students to ‘work technologically’. The QSA Years 1-10 Technology Syllabus (QSA, 2003, p.1) indicates that:

“Working technologically’ describes a way of working that interweaves technology practice, information, materials and systems with considerations of appropriateness, contexts and management.”

The 2 page summaries provided identify the outcomes related to technology practice, information, materials, and/or systems. They also identify the relevant aspects of appropriateness, contexts and management.

Acknowledgements

The contributions of those students who have developed the design challenges contained in this booklet are acknowledged.

Dr Glenn Finger
Senior Lecturer, School of Education and Professional Studies
Griffith University, Gold Coast campus
Email: G.Finger@griffith.edu.au
images of working technologically

investigating

ideating

producing

evaluating
...with considerations of contexts, appropriateness and management
...reflecting a creative design process
Contents

What a Load of Rubbish! The Eco Depot – Simon Doe and Nicole McRedmond ............................... 1
Fight for Survival - Alanna Mathiesen and James Petersen .......................................................... 3
Staging a Drama - Ally Luke and Kara Knowles ........................................................................... 5
The Opendgate Pool Cover - Anna Ramsay and Tamera Freeman .............................................. 7
Kidstropolis - Brendan Drought, Wendy McKay and Jaki Parkinson ........................................... 9
Perfect Parking at Griffith University - Nicholas Hall and Chantell Hutchinson ....................... 11
Footy Fever - Carly Day and Brett Pamenter ............................................................................... 13
The Desktop Toy Challenge - Kate Boyd and Kylie Maule .......................................................... 15
Top Secret Spy Gadgets - Ruth Law and Scott Pearson ............................................................... 17
Playground Obstacle Course – Yolanda Simpson and Matthew Goonan ..................................... 19
Sustainable and Renewable Energy - Allan Richardson and Alisa Remeikis .............................. 21
An Attraction for All Ages - Josh Beecher and Robert Keen ....................................................... 23
A Festive Cheer for the New Year - Kara Lonergan and Jaime Perkins ......................................... 25
Green Day Tour Merchandise - Lauren Mitchell, Bree Sloss and Sara Thornton .......................... 27
Moving Rainforest Gallery Walk - Leandra Thomson and Katherine Moore ............................... 29
The Classroom of the Future - Megan Hunter, Rosemary Arthur and Sarah Durrington ............ 31
Quick Glove - Melissa Brotchie ..................................................................................................... 33
Flood Plain Challenge - Nathan Tait, Donna Cotugno and Lara Tideswell ................................... 35
It’s Time To Party In The Palace! - Nicola Hewitt-Stubbs and Elizabeth Fraser ........................... 37
Fun for Everyone - Paula Musson ................................................................................................ 39
The Lunch Companion - Chantelle Lee and Alison Furlong ........................................................ 41
Energy Saver School - Jan Laws and Renee Coventry ................................................................. 43
Save the Sea Life - Karli Brossmann and Todd Buchan .............................................................. 45
Incentives for Recycling - Lyn Booth and Denise Rennett ............................................................ 47
A Relaxing, Entertaining and Creative Tuckshop - Sally Ellis and Rebecca Dunn ..................... 49
Light Rail System - Sarah Bain and Mitch Campbell ..................................................................... 51
Recycled Water - Sarah Taylor and Sarah Dallimore ................................................................. 53
Safe Playground - Shannon McKinley and Jessica Boyle ............................................................ 55
Baby Mobile - Tempest Richards-Timoti and Kelly McMaster .................................................... 57
Jersey for the Titans - Alex Bruce and Mikaella Vercoe ............................................................... 58
Income Generating Recycling System For Schools - Brooke Bloxsom and Sasha White ........... 60
Sustainable Outback House - Carol Jackson and Natalie Johnstone ........................................ 62
You Rule the School!! - Damien Meyers and Juliet Grace ....................................................... 64
Eco Friendly Home - Holly Wilkie, Jacqui Lather and Claire Roberts........................................ 66
The Me-Bag - Jo Clothier and Fiona Jackson.............................................................................. 68
Water 2 Water - Nicole Heyes and Kate Phillips........................................................................ 70
A Book for the Visually Impaired - Kellie Ellison & Kim Kouimanis ........................................ 72
The Suburban School Chook Pen - Lisa Janson and Ebony Cooke ........................................... 74
Rubbish Receptacle - Robyn Nicholls, Joanne Pascoe and Colleen Ringland ............................ 76
The Hybrid Animal Species - Erica Byrne and Kylie Hopf ......................................................... 78
Building in Flooding Areas - Kathy-Lee Peers and Rebecca Taylor ........................................... 80
Shipwrecked - Rajinder Ghooti and Tawnee Riehl .................................................................... 82
Kitchen Garden – Vanessa Brookfield and Claire Caple............................................................... 84
A Book for Visually Impaired Children - Kellie Ellison & Kim Kouimanis ................................... 86
Let The Game Show Begin! - Lisa Cassar and Matthew James Garrett ....................................... 88
Australian Shelter - Romy Proudfoot and Vicki Campbell .......................................................... 90
Healthy Eating, Special Friends Recipe Book - Kelly Farrelly and Lydia Berndt ............................ 92
The Ultimate Movie Monster - Michelle Chitts and Michelle Duncan ........................................ 94
S.P.I.C. 2010 - Paul Finger ............................................................................................................. 96
Learning Centre of the Future - Renae Tuckey, Alice Foster and Rachel Woodford ................... 98
The Beach Hut - Tom Clements and Craig Newton .................................................................... 100
A Fun Classroom for Kids Made by Kids - Jodi Langenhoven, Melissa Redman and Shalee Taylor .......................................................... 102
Solar Smart Spectacular - Lisa Gorniak, Teysha Crane and Lauren Atherton ............................ 104
Parking Problem... No Problem! - Anastasia Scott and Melissa Warwood................................. 106
Land Yacht - Danielle Whalan .................................................................................................... 108
The Surfer Buddy - Amy Williamson and Zoe Wagland ............................................................ 110
The Rain, Hail or Shine Clothesline - Amanda Knight and Louise O’Grady ............................... 112
The Ultimate Penguin Playpen - Glenys Fraser and Jenna Battye ............................................. 114
Ideal Classroom - Jenna Douglas and Tammy-Lee Telford ....................................................... 116
Turbo-vac 5000 - Adam Collie and Katherine Scott .................................................................... 118
Healthy Heroes - Hayden Park and Samantha Muir .................................................................... 120
Design Challenge: What a Load of Rubbish!
The Queensland elections have just been completed and we have elected a hung parliament with two independent Green Members holding the balance of power. In order to form a minority government the Premier has persuaded the Greens to back him by offering large sums of money for environmental projects. One of these projects is to build a new refuse depot and you have been commissioned to design it. You have only two constraints: The design must include features to encourage recycling and have long term economic viability. Good Luck!

Outcomes, Levels and Strands
Technology Practice:
TP4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternative within design challenges.
TP4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP4.3 Students identify and make use of the practical expertise of others when following production procedures to make product for specific users.
TP4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information:
INF4.1 Students analyse sources and forms on information and match these to the requirements of design challenges.

Materials:
MAT4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Systems:
SYS4.1 Students identify and explain the logic of systems and subsystems.

Activities
Investigation: Students will keep a log of the types of waste products that are disposed of in their homes during the period of the investigation. Students identify the waste products disposed of in the community that can be recycled and reused by researching on the internet and visiting the library. Students will also spend time researching the effects on the environment of inadequate waste disposal and conduct investigations into the positive effects of recycling and reusing in slowing down environmental damage. Guest speakers from the GCCC’s Wipe Out Waste program will be invited for a question and answer session with students which will involve students researching questions to ask during session. A class excursion to the Logan Recycling Centre, “SmartTip” will enable students to identify some recycling ideas that have already been implemented.

Ideation: As a whole class students will decide on a design criteria based on their new knowledge of waste disposal. Students will break into groups of 2/3 to analyse information gathered from research and excursion and collaboratively discuss ideas and possible solutions to the design challenge. Students will select their design solution and materials for the purpose of creating a 2D diagram detailing their design proposal. Students will present their drawings to the class and describe how their design meets the criteria. Students will peer assess each groups design. Within their groups students will decide on materials and tools that will be required for their design production.

Production: Students as a group will discuss and decide on roles and identify sequence of construction of their design to facilitate smooth construction. Students construct the 3D model of their Recycling Centre following their design diagram.

Evaluation: Students evaluate design using design checklist and diagram details to ensure their design meets the criteria. Students will use self assessment and peer assessment in the evaluation of their design and it’s success in encouraging recycling. Students will present their models to the class within their groups after negotiating the role each member will play in the presentation. Students will ask questions to the presenting group about their design. Class discussion on the design challenge with a feedback sheet will conclude the evaluation.

Crosscurricular Learnings
<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand, Level &amp; Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOSE</td>
<td>Investigating environmental and ecological factors in relation to waste disposal. Research into consumption and waste disposal in the community.</td>
<td>PS 4.1, PS 4.3, PS4.5</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Working to scale, Graphing community waste, 2D diagram and 3D model design and creation.</td>
<td>CD4.1 S4.1</td>
</tr>
<tr>
<td>English</td>
<td>Researching information, group work, questioning of guest speaker, design presentation.</td>
<td>CU4.2, CU4.3</td>
</tr>
<tr>
<td>Science</td>
<td>Recycling process, Decomposition Process in waste</td>
<td>Nat &amp; Proc Mat 4.3 &amp; D4.4 Life &amp; Living 4.3</td>
</tr>
<tr>
<td>HPE</td>
<td>Research, discuss and critically evaluate information they find and decide what is most appropriate for an ecologically supportive community waste disposal system to best benefit their physical, emotional and social health according to their findings. Collaborative design challenge – students display appropriate group work skills – respect for other members ideas, listening to others, equal share of work load</td>
<td>PH4.5 , PD4.4</td>
</tr>
<tr>
<td>The Arts</td>
<td>Visual Arts Construction of 3D model</td>
<td>VA4.2</td>
</tr>
</tbody>
</table>

Assessment Ideas
<table>
<thead>
<tr>
<th>Technique/Instrument</th>
<th>Anticipated Source of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation notes</td>
<td>Research skills and abilities, Use of resources, Contributions to discussions on findings. Effective group work behaviours.</td>
</tr>
<tr>
<td>Checklist</td>
<td>Active participant, Discussions show understanding of the topic of waste disposal, Demonstration of collaborative practices within the group.</td>
</tr>
<tr>
<td>Teacher Student Consultation</td>
<td>Open-ended questions to encourage students to give detail on what they have learnt and their thought process on ideation of their design.</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Focused Analysis checklist</td>
<td>Design criteria checklist created by students, appropriate and relevant for evaluation of own designs and those of peers.</td>
</tr>
<tr>
<td>Peer and self assessment</td>
<td>Assessments demonstrate students understanding of design challenge and thorough evaluation of own designs and those of peers.</td>
</tr>
</tbody>
</table>

**Context**

**Global:** Through research students understand factors such as environmental issues effect the whole world and understand the importance of recycling in protecting the world we live in.

**Home and family:** Students' log book on family waste disposal creates links between the home and the school. Investigation at home encourages students to discuss with family members what they are learning.

**Personal:** Students’ develop appreciation and understanding that they can make a difference in environmental issues and have power to assist in educating on recycling.

**Communities:** Students design a refuse depot to satisfy the needs of local residents. They conduct surveys within the local community to help determine what would be appropriate to meet community needs.

**Business:** Investigating economical viability for their design, excursion to SmartTip

**School:** Group work, problem solving,

**Industry:** Selection of materials for design.

**Appropriateness:**

**Aesthetic:** Does the design model have unique design features? Is the design well presented and has an attempt been made to work to a scale? Have recycled materials been used in design product?

**Functional:** Does the design promote recycling and reusing? Does it provide for efficient and effective refuse disposal? Does it meet the needs of the user?

**Economic:** Is there evidence that economic viability has been considered in the design? Has the actual design product been made to budget constraints?

**Environmental:** Does the design demonstrate an understanding of environmental issues in relation to disposal of a variety of materials? Does the design educate about recycling and reusing? Has the model been made from recycled and reusable materials?

**Functional:** Has the design met the requirements of efficient and effective waste disposal with focus on recycling? Has the design met the social and cultural needs of the community?

**Resources:**

**Investigation and Ideation:** Internet access, guest speakers, excursion to SmartTip, Digital camera, references books, pens and paper, journal books

**Production:** Bought – Modelling clay $3.00, Craft glue $4.00, Toothpicks .50c and Coloured cardboard $2.00 =Total $9.00 – also used paints and paintbrushes supplied in technology room.

**Recycled** – play dough, rubber, cork, fly screen, cardboard, paper clips, straws, paper, rice, balsa wood, food dye, plastic, Equipment – scissors, ruler, paintbrushes, pliers, staples and stapler, sticky tape, computer with Microsoft Office and printer for building graphics. Students will be able to produce a model within a budget constraint of $10.00 with emphasis on recycled items to fit in with theme of the design. Model will be no larger than 45cm x 45cm x 30cm.

**Management:**

**Health & Safety,** Conduct whole class discussion on safety issues with design challenge, rules and requirements to be written up as a poster for students to refer to at any time,

**Managing People - Managing oneself and others,** Students will negotiate on roles to ensure everyone has a clear understanding of their roles and responsibilities, Students use interpersonal and intrapersonal skills within the group design and production. Promote ownership and responsibility for working space and respect for other group spaces. Working

Collaboratively, Negotiate their roles, Model and develop the behaviour of asking for assistance and suggestions from other group members, listen and respect each others ideas and contributions, consider group strategies and planning for effective design production.

**Managing Resources - Investigation and Ideation,** Provide a large variety of resources for students to use in investigation. Encourage students to search for own resources also. Ensure guest speakers have explicit understanding of the information the students are looking for. Production, Class discussion on types of materials that could be used at commencement of investigation phase to allow students ample opportunity to collect items. Organise space in classroom and provide two large storage bins with one for use by any group and one for labelled items required by specific groups.

**Managing Opportunities – Enterprise,** Student centered activity promoting student responsibility in working collaboratively, making decisions, communicating and problem solving. While a few constraints exist design challenge is quite open allowing for student imagination and risk taking in design features. Creating a supportive environment in the classroom fosters student participation in these enterprise qualities and competencies. Marketing, Students are to demonstrate during presentation of design drawings and final model the features that work towards economic viability of resource depot. Students will also be encouraged to design slogans and phrases that will highlight their design features for their final presentation.

**Managing Constraints: Time,** Students must be aware of time constraints and use time effectively to ensure design completion. Encouraging time management skills such as prioritising and short term goals will assist in students meeting time constraints. Budget, Design materials must not exceed $10.00. Allowing ample time for collection of a wide variety of recycled items will aid students in adhering to this constraint. Design, Self and peer assessment after ideation phase will ensure features of design meet criteria. Model to be built to closely follow design plan although some negotiation will be undertaken for new ideas and improvements during the construction. Size of model to be no larger than 60cmx60cmx40cm.
# Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>OUTCOMES</th>
<th>ACTIVITIES / EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.P.E</td>
<td>Epd 3.4 Students demonstrate communication, cooperation and decision-making skills to collaborate in social, team or group situations.</td>
<td>Group Work.</td>
</tr>
<tr>
<td></td>
<td>Epd 4.4 Students demonstrate skills and actions that support the rights and feelings of others, while adopting different roles and responsibilities in social, team or group activities.</td>
<td>Group Work.</td>
</tr>
<tr>
<td>ENGLISH</td>
<td>Cu 4.1 When speaking students develop a main idea or point of view providing some supporting details and evidence to explore ideas and issues.</td>
<td>Presenting method to other group members and model to the class.</td>
</tr>
<tr>
<td></td>
<td>Cu 4.2 When reading and viewing students identify relevant information and draw conclusions.</td>
<td>Researching ideas and devising a method.</td>
</tr>
<tr>
<td></td>
<td>Cu 4.3 When writing and shaping, students: organise subject matter that develops a topic, supports a point of view and offers an explanation</td>
<td>A4 method explanation.</td>
</tr>
<tr>
<td></td>
<td>Op 4.1 When speaking students use pace, volume, pronunciation, movement, gesture and facial expression to convey meaning.</td>
<td>A4 model summary.</td>
</tr>
<tr>
<td></td>
<td>Op 4.3 When writing and shaping, students: elaborate ideas and support a position using textual features and visual resources</td>
<td>A4 method explanation.</td>
</tr>
<tr>
<td>VISUAL ARTS</td>
<td>Va 4.2 Students make and display images and objects, considering purposes and audiences.</td>
<td>Blue print design.</td>
</tr>
<tr>
<td>SOSE</td>
<td>Srp 3.3 Students apply the principles of democratic decision-making in cooperative projects.</td>
<td>Group work.</td>
</tr>
<tr>
<td></td>
<td>Srp 4.2 Students plan and manage an enterprise that assists a community or international aid project.</td>
<td>Group work and design process.</td>
</tr>
<tr>
<td>Science</td>
<td>Ss 4.2 Students use the elements of a fair test when considering the design of their investigation.</td>
<td>Students evaluate and test their model to see how effective and appropriate it is for achieving the objective.</td>
</tr>
<tr>
<td></td>
<td>Npm 4.3 Students examine and assess ways that materials can be changed to make them more useful.</td>
<td></td>
</tr>
<tr>
<td>MATHS</td>
<td>N 4.2 Students identify and solve addition and subtraction problems involving whole numbers, decimal fractions and common fractions.</td>
<td>Throughout the design process, depending on the method and design students choose their will be a variety of mathematical problems to address.</td>
</tr>
</tbody>
</table>
**Assessment Ideas:**
Anticipated evidence:
Contribution logs, A4 method summaries, design blueprints, models, A4 model summaries, reflections, presentation rubrics, anecdotal notes and observations.
Students will be assessed on their ability to work and contribute in groups, using anecdotal notes, observations and contribution logs.
Students will be assessed against criteria which will assess appropriate English skills and content relevance for their A4 method summaries, A4 model summaries and reflections.
Students will be assessed on the clarity and appropriateness of their final models and design blueprints.

**Context:**
*Personal:* Children gain personal satisfaction and pride from completing and presenting a challenging task that interests them. Also they develop their problem solving and critical thinking skills.
*School:* Students will learn how to work in groups and gain experience in sharing and accepting other people’s ideas or opinions (interpersonal skills) and develop their communication skills.
*Community:* Students consider the needs of a human community to survive.

**Appropriateness:**
*Functional:* Does the model achieve its desired objective?
*Aesthetic:* Is the model appealing and does it enhance the presentation?
*Economic:* Does the model come in under budget? Would the model be a viable option considering the time, energy, materials and people required to develop and operate it?
*Environmental:* Does the model have an adverse affect on the environment of the island? Does it promote sustainability?
*Ethical:* Does the implementation of the model raise any ethical issues? Eg: Hunting and the humane treatment of animals.

<table>
<thead>
<tr>
<th>Resource</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light</td>
<td>$4.00</td>
</tr>
<tr>
<td>Storage Bucket</td>
<td>Nil (pre-owned)</td>
</tr>
<tr>
<td>Stone</td>
<td>Nil</td>
</tr>
<tr>
<td>Sand, shells, sticks, leaves</td>
<td>Nil</td>
</tr>
<tr>
<td>Cardboard</td>
<td>$0.40</td>
</tr>
<tr>
<td>Angle grinder</td>
<td>Nil (pre-owned)</td>
</tr>
<tr>
<td>Nails</td>
<td>Nil (pre-owned)</td>
</tr>
<tr>
<td>Plastic Sheet</td>
<td>Nil (pre-owned)</td>
</tr>
<tr>
<td>Water trough (drink bottle)</td>
<td>$2.49</td>
</tr>
<tr>
<td>Total</td>
<td>$6.89</td>
</tr>
</tbody>
</table>

**Management:**
*Managing people*  
Students develop interpersonal skills through individual, collaborative and cooperative development of their final model and associated documents.

*Managing resources*  
Students use a variety of resources to develop their model.

*Managing opportunities*  
Students use imagination, identify and put ideas into practice, make decisions and solve problems, plan manage and organize action, communicate and negotiate with others and work cooperatively.

*Managing constraints*  
Students are able to submit and present their work by the due date. Students are able to develop their model under budget.
Staging a Drama - Ally Luke and Kara Knowles

Design Challenge: Staging a Drama
The Drama club here at school is putting on a production at the end of the year!! There is only one problem. They don't have a stage to perform on. They have called on class 5P for help. Your job is to design an appropriate stage and a set that depicts a scene from a movie of your choice. Make sure you consider aspects such as curtains, wings and other stage elements. What is your stage made of? Does it have stairs? How will you hang a backdrop? Where will the school band go? What props will you use? These questions and more must be taken into consideration in the designing of the perfect stage. After you have investigated and designed your stage, you must make a scale model of your design for entry with dimensions no larger than 450mm x 450mm x 300mm. Good luck!

Level 3 (year 5)

Outcomes and Strands:

Technology Practice:
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.

Information
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.

Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:

Investigating:
- structures of the stage
- materials required
- safety
- aesthetically pleasing

Ideating
- students use information gathered and work individually and together to design an appropriate stage for their school
- students draw up a plan of the stage that they wish to construct

Producing:
- students collect materials for the construction of the stage
- students use their plan and work together to construct the stage taking into consideration the outlines measurements and safety concerns

Appraising/Evaluating:
- throughout the construction process students continually review and modify their design as required
- students keep a journal of their progress and fill in a self assessment of their contribution and overall achievement
- students take part in a gallery walk and constructively evaluate their peers models

Crosscurricular Learnings:
- English- Journal writing and note taking
- The Arts- Students create aesthetically pleasing designs and think about needs of drama (stage)
- Mathematics- Students have to consider what dimensions their materials must be to fit together in a working model of a stage. They also must understand the concept of scale drawings.

Assessment Ideas:
- Journal entries
- Individual and group participation and performance
- Self and peer assessment
- Working models
- Observation and anecdotal notes

Context:
- School:
- Community:
- Business:
- Industry:

Appropriateness:
- Aesthetic: Pleasing to look at
- Cultural: The drama stage can be used for any culture to use
- Economic: Funding form the school will be needed to build the stage
- Functional: It has a functional purpose within the school and will be used by many of the students and staff

Resources:
Management:

Managing people
- Effective group work and individual work, conflict resolution.
- Safety procedures, and behaviour management.

Managing resources
- Information, and systems.
- Assuring quality products and processes.

Managing opportunities
- Flexibility in realizing Crosscurricular opportunities and extension of possible learning experiences

Managing constraints
- Time to complete at school and at home
- Money constraints (staying under the budget allowed)
- Size (being able to keep the model under the dimensions allocated)
The Opengate Pool Cover - Anna Ramsay and Tamera Freeman

Design Challenge: The Opengate Pool Cover
Backyard swimming pools are a way of life in suburban Queensland. There are approximately 310,000 pools in Queensland; however there are many issues that complicate this way of life, such as safety and water conservation. The Gold Coast City Council and The Pool Builders Association of Queensland have sent out the call for designs that would address one or both of these issues. Your task is to design a swimming pool or alteration to an existing design, that addresses one or both of these issues.

Outcomes, levels and Strands
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities
Investigate
Students look at their backyard pools, and all those of family neighbours and friends and examine all existing safety and water conservation features. Findings would be recorded in a working diary.
Students investigate state legislation regarding water conservation and pool safety through sources such as the internet, library and human resources – results recorded in working diary or design portfolio.
Students conduct surveys as to how many students within their school has a pool – results recorded.

Ideating
Students keep a diary of evidence collection including pictures initial sketches and data.
Students for pairs to select their best ideas (think, pair, share). Pairs then join into groups of four, and then choose unanimously a design that best meets the design challenge.
Students will then consider what materials are needed for construction keeping in mind constraints and availability of materials.

Production
Students will work collaboratively to devise a work schedule and write a procedure as to how the model is to be constructed.
Students will consider safe work practices for all equipment needed to produce the design challenge.
Students will continually evaluate their design process and modify and change where required and record these changes in their working diary.

Evaluation
Students record the difficulties and problems that were encountered during the design and construction processes.
Students present their model to the class incorporating a brief rationale of production methods and cost.
Students take part in a gallery walk where all design challenges are peer assessed.

Crosscurricular Learnings

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand Level Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CD 3.2 Students design and trial a variety of data collection methods and use existing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>sources of data to investigate their own and others’ questions, organise data and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>create suitable displays identifying and interpreting elements of the displays</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Promoting the Health of Individuals and Communities 8.3 Student identify potential</td>
</tr>
<tr>
<td></td>
<td></td>
<td>hazardous situation and demonstrate actions to respond to unsafe and emergency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>situations</td>
</tr>
<tr>
<td>Math</td>
<td>Representing results of survey in a graph</td>
<td>PS3.2 Students create and undertake plans that aim to influence decisions about an</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS 3.3 Student cooperatively collect and analyse data obtained through field study</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>SRP 3.3 Students apply the principles of democratic decision making in cooperative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HPE</td>
<td>Considering safety of one another Be aware of hazardous/risk situations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SOSE</td>
<td>Collecting data Working cooperatively Working to the ethos of the design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>challenge in the aspect of safety and water conservation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Working Journal Procedures list Presentation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Research skills</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Writing and Shaping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CU 3.3 When writing and shaping students; Negotiate purpose for writing and shaping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>select relevant genre and medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Research familiar and unfamiliar ideas and information to develop a topic or argument</td>
</tr>
<tr>
<td></td>
<td></td>
<td>that uses some elaborated ideas with supporting details</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Considers interests of the audience when selecting subject matter OP3.3 Organise and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>link ideas using generic structure, layout, text connectives, conjunctions and</td>
</tr>
<tr>
<td></td>
<td></td>
<td>referring words</td>
</tr>
</tbody>
</table>
Speaking and Listening

DP3.1 When speaking students use a logical sequence when organising ideas
Uses processes and attributes that offer opinions
Speak audibly with clarity by using projection articulation and appropriate volume

CR3.1 When speaking students use aspects of subject matter and resources to construct positive or negative representations of people, places events and things to achieve their purposes

Assessment Ideas

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Sources of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Anecdotal records on progression of group work and cooperation</td>
</tr>
<tr>
<td>Consultation</td>
<td>Teacher/group interview with specifics to design challenge</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Criteria sheet for student portfolio which includes working diary, designs, reflection and oral presentation</td>
</tr>
<tr>
<td>Self and peer assessment</td>
<td>Written reflections, Peer assessment sheets from Gallery walk</td>
</tr>
</tbody>
</table>

Resources

Students are to remain within a $10.00 budget. In addition, students are encouraged to collect and recycle items from around the home, such as boxes, egg cartons, plastic bottles, fabric etc. Students will be supplied with some staple equipment in the classroom, such as glue, cardboard, paint and sticky tape.

Management

People
- Students work in small groups and, therefore, they must work collaboratively to address the issues of the design challenge, including health and safety and the production of the design challenge product.

Resources
- Students must work together to identify and evaluate materials and resources that are needed to develop their design challenge product.

Opportunities
- Students will present their design challenges to the class, and must therefore present interesting and creative ideas that solve the problem set in the design challenge.

Constraints
- Students will have eight weeks to prepare their design challenge solution and present it to the class. They will need to adhere to a budget of $10.00 and the final design model will have the dimensions of 450mmx450mmx300mm.

Context

Personal
- Students develop good communication and problem solving skills that will allow them to develop their design challenge product.

Community
- Students, through their research, will gather information about the usefulness of their design challenge product for the local community.

Industry
- Students will consider the different government regulations, in regards to water safety and conservation, that are associated with the construction of a pool.

Leisure and Recreation
- Students will investigate how regulations and laws impact the way in which products are developed for leisure and recreation activities.

Appropriateness

Aesthetic
- Is the design visually pleasing? Will it alter the current perceptions of the Queensland outdoor lifestyle?

Economic
- Does your model come in under budget? Will your model be affordable to potential buyers?

Environmental
- Is your design constructed from recycled materials? Does it address the need for water conservation?

Functional
- Does your product meet the set needs of the design challenge?

Social
- Does your design meet the needs of a range of people from a variety of ages and abilities?
Kidstropolis - Brendan Drought, Wendy McKay and Jaki Parkinson

A World of Kids, for Kids & by Kids

Design Challenge:
Calling all Grade 3 classes around the world! DisneyPixar are 'createating'™ a sequel to Monsters, INC. - Kids, INC., and they want you! Grade 3 classes worldwide are invited to Investigate, Ideate, Produce and Evaluate their very own downtown 'Kidstropolis'! … A World of Kids, for Kids & by Kids… Yes – finally; it’s all about you!

Outcomes, Levels and Strands:

- **Technology Practice, Level 2**
  - TP 2.1 Students organise knowledge, ideas and data about how needs and wants might be met and use this information when meeting design challenges.
  - TP 2.2 Students generate ideas, acknowledge the design ideas of others and communicate their design ideas using annotated drawings that identify basic design features.
  - TP 2.3 Students identify sequence and follow production procedures to make products of their own design.
  - TP 2.4 Students consider initial design ideas with final products and give reasons for similarities and differences.

- **Information, Level 2**
  - INF 2.2 Students use simple techniques for accessing and presenting information for themselves and others.

- **Materials, Level 2**
  - MAT 2.1 Students match the characteristics of materials to design requirements.
  - MAT 2.2 Students select and use suitable equipment and techniques for manipulating and processing materials.

- **Systems, Level 2**
  - SYS 2.2 Students combine components to assemble systems in order to meet their needs and the needs of others.

Activities: (This list should not be considered sequential in progression; students can and should move back and forth between components.)

- **Investigation**
  - Collaboratively: students view Monsters, Inc.
  - In pairs: students conduct internet searches for blueprint/town planning programs.
  - Collaboratively: students invite local town planner in to discuss aspects of planning.
  - Individually: students ask questions to and note down answers from town planner.
  - In pairs: students undertake questionnaire to investigate ideas, thoughts and feelings of younger students.

- **Ideation**
  - Individually: students sketch ideas for Monstropolis and provide annotation.
  - Collaboratively: students present their ideas to class and discuss town planning ideas.
  - Collaboratively: students discuss possible resource requirements.
  - In pairs: students ideate plans for one feature of the streetscape.
  - Collaboratively: students ideate plans for town centre and other special group features.

- **Production 'Createate'™**
  - Collaboratively: students develop a questionnaire for younger students.
  - Collaboratively: students collate questionnaire findings in graph form.
  - Collaboratively: students decide on streetscape plan design and resources via a democratic vote.
  - In pairs: students create one feature of the streetscape.
  - Collaboratively: students create base of streetscape, town centre and other special group features.
  - Collaboratively and in pairs: students put design challenge streetscape together.

- **Evaluation**
  - Collaboratively and in pairs: students decide what will be included and excluded in streetscape.
  - Collaboratively, in pairs and individually: students peer and self assess own and group ideas, processes and finished product – was their goal achieved, does the final product reflect their initial and ongoing ideas, what are the strengths and weaknesses, what would they change next time, what would remain the same, and, what do they consider their personal greatest achievement?

Context: As students are ‘expert’ at being kids, the central context for this challenge will be ‘poly-KID-textual’!

- **Childhood**: Social and cultural knowledges wanted!
- **Learning & Teaching**: Guided and open discovery - wild ideas desired!
- **Global**: “Borrow” an idea and make better, or start afresh!
- **Grand Narrative**: Tell your story through technology!

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activities</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>- Interviewing town planner</td>
<td>S&amp;L: CU 2.1</td>
</tr>
<tr>
<td></td>
<td>- Conducting questionnaire</td>
<td>S&amp;L: CU 2.2</td>
</tr>
<tr>
<td></td>
<td>- Viewing Monsters, Inc. DVD</td>
<td>R&amp;V: CR 2.2</td>
</tr>
<tr>
<td></td>
<td>- Letter to town planner</td>
<td>W&amp;S: OP 2.3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>- Creating graphs</td>
<td>CD 2.2</td>
</tr>
<tr>
<td></td>
<td>- Creating blueprints</td>
<td>S 2.2</td>
</tr>
<tr>
<td>SOSE</td>
<td>- Ideating Kidstropolis</td>
<td>PS 2.3</td>
</tr>
<tr>
<td></td>
<td>- Ideating resource possibilities</td>
<td>SRP 2.5</td>
</tr>
<tr>
<td>HPE</td>
<td>- Undertaking questionnaire (behaviour)</td>
<td>EPD 2.2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EPD 2.4</td>
</tr>
<tr>
<td>The Arts</td>
<td>- Sketching, creating and painting Kidstropolis features, town centre and other special features</td>
<td>VA 2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>VA 2.2</td>
</tr>
</tbody>
</table>
Assessment Ideas:
Throughout the design challenge, demonstrations of student progress and products will be stored and assessed via an archival (box) portfolio in addition to an e-portfolio.
The techniques employed throughout the design challenge should include:
Observation: Tracking progress & participation levels using checklists, sketches and annotated pictures.
Consultations: Anecdotal records, technology ideation workbook, and questionnaire.
Focused analysis: Group discussions, research, production, annotated pictures, displays, video footage, technology ideation workbook and journal.
Peer and self assessment: Video footage, annotated pictures, technology journal.

KID-propriateness!
Aesthetic: The model should be visually appealing, will fit well with the work of all class members and will be peer/self assessed based on their own annotated pictures.
Cultural: Whilst presented as a ‘worldwide challenge’, students need only create a streetscape addressing their own world, prior experience & culture.
Economic: A small budget may be set, however recycled/pre-loved materials are preferable!
Environmental: Reduce! Re-use! Recycle! The finished model will make use of unwanted/unused or existing items.
Functional: The model need only be just that – a model created as representation of ‘Kidstropolis’ for presentation.
Ethical & Social: This challenge provides a variety of contexts for teacher awareness, e.g., acceptance of ideas and thoughts of others. Similarly, whilst this challenge is situated within a context where conventional constraints have been removed; social roles and gender issues may arise and should be faced within a values-based approach.

Resources:
Recycled, pre-loved and/or existing materials are preferred for this challenge; original features should incur little cost.

Management: KID-agement!
Managing people: working individually, in groups and as a class; students will be required to have respect for and share with others Teachers should provide adequate time and space for them to do so, in addition to identifying potential health and safety risks.
Managing resources: Features to be made from pre-loved, recycled and/or existing materials from home and/or school. Students should consider needs and ideas of their peers, in addition to family/friends/community resources. Internet & library access should be provided by the teacher for research and investigation.
Managing opportunities: As students will be presenting and evaluating their model upon culmination they should work and plan accordingly. Use of imagination and risk taking is encouraged however, students must be able to effectively communicate and produce
Managing constraints: Design challenge should require minimal budget (if any!), will take place over ten weeks and final model must be a place that kids would love!
Perfect Parking at Griffith University - Nicholas Hall and Chantell Hutchinson

Design Challenge: Perfect Parking at Griffith University

Ever tried to park your car at the Griffith Gold Coast Campus? It can be a terrible nuisance. Having such an annoyance in finding a car parking spot that isn’t three suburbs away from your lecture theatre certainly has flow on affects for the students, administration staff and lecturers enrolled or employed at our beautiful Griffith University Gold Coast Campus. These include causing students to be prone to stress which can lead to accidents and road rage also affecting study time and health.

Your task is to help the tertiary students and employees/employers of today by improving their car parking situation and then reap the benefits for yourselves in the future. Your challenge is to design a model incorporating structural improvements to the Gold Coast Campus that make parking more readily available and convenient for our car driving study-bugs. Just how functional and aesthetically pleasing can you make extra parking be?

Constraints: - You have a budget of $10 for the model - Your model must be no larger than 450mm x 450mm x 300mm

WHAT ARE YOU LOOKING AT?

Outcomes, Levels and Strands

Getting going!

Outcomes

Technology Practice

TP 4.1 - Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 - Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 - Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 - Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information

INF 4.1 - Students analyse sources and forms of information and match these to the requirements of design challenges.
INF 4.2 - Students apply techniques for transforming and transmitting information for different audiences.

Materials

MAT 4.2 - Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Systems

SYS 4.1 - Students identify and explain the logic of systems and subsystems
SYS 4.2 - Students incorporate feedback to refine and modify systems and/or subsystems

Activities

Investigating:

- Students visit the multi-storied car park at Engineering Drive and study the design and materials used in the building as well as the systems and layout (e.g. ticketing and spacing) that cause it to operate successfully. The students will survey car park users to gain feedback on problems and strengths of the current system. Students will then survey the land at Griffith University to determine possible sites for a new car park and examine the strengths and weaknesses of using available land for a park site. Students will survey traffic flow and areas of congestion. The class will be visited by a guest speaker who specializes in structural engineering/ construction to inform their design. Students will research on-line and community resources to gather vital information for ideation stage of design.

Ideation:

- Students use graphic organizers (e.g. mind maps, Venn, spider diagrams) to map out ideas for their model and then refine to better suit criteria formed in the investigating stage. Students collaborate appropriate ideas and form proposal sketches and mark exact location (e.g. from photos/data of existing GU architectural designs – colours, shapes and themes) and submit these to the teacher (Gold Coast Council compliance representative). Students will list and label available materials that meet the size and price constraints, taking into account availability and functionality (e.g. home materials, construction cutoffs).

Producing:

- Students finalize their design and compile resources for use in construction. Students work together to establish construction processes (e.g. foundations for a high rise car park). Students recognize and adhere to safety procedures of a technology working environment that have been instilled during the term. Students begin to construct their working model and note procedure after each step. It is ensured that all students contribute to the production equally as all inputs/ideas are valued within our Technology working environment.

Evaluation:

- Students design parameters for testing e.g. students test the structure of a multi-story car park to hold the weight of a load of vehicles on each level. Students judge their design in relation to technology elements (e.g. functionality, appropriateness, aesthetic appeal). Students reflect on the ability to meet these criteria and evaluate and plan further enhancements and modifications. These modifications can be made on improvisation to the design to meet the intended purpose e.g. maximum load of vehicles on each level of the car park or accessibility of road access to and within car park. Constructive and explanatory judgments can be made by peer and self-evaluation to highlight possible areas of improvement and perspectives from different viewpoints e.g. environmental and cultural views.

Appropriateness

Functional - Does the design serve to improve the parking situation at the Gold Coast Griffith campus by housing numerous institution members’ vehicle? Is it a viable option for these people to use this product?

Aesthetic - Does the design of this car park complement visually its surrounding structures and environment and is its design styled appropriately for its function and its era?

Environmental - Is the structure putting the environment/ecosystem at unnecessary risk of deterioration as a result of construction now or into the future?

Economic - Will the pricing of parking in the structure make it feasible for the institutional to build and maintain?
Resources
Students use various resources in construction of design. These may include cardboard, recycled boxes, toilet rolls, plywood, paddle pop sticks, bottles, paint, nails, glue, markers and rulers.

Cross-curricular Learnings

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level and Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>M 4.1</td>
<td>Students will be working to make their model to scale, and will have to consider measurements when surveying the plot of land, producing materials that are within proportion and are of appropriate length, area and volume.</td>
</tr>
<tr>
<td>SOSE</td>
<td>PS 4.1</td>
<td>Students consider the affects of the clearing of vegetation for the purpose of constructions that adequately serve the needs of citizens and must justify the ecological friendliness of their design. Students will study and take into account the features of such buildings that conserve and sustain the health of the physical environment. Surveying users of car parks will contribute to solving the problems of car parking in this context.</td>
</tr>
<tr>
<td>Visual Arts</td>
<td>VA 4.2</td>
<td>Student design solutions during ideating-sketching/planning/construction, considering the advantages and disadvantages of existing car parks as well as their purpose and audience.</td>
</tr>
</tbody>
</table>

Assessment Ideas

<table>
<thead>
<tr>
<th>Assessment Technique:</th>
<th>Evidence:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Students observe the technological process and record this process in a portfolio of student contributions and work (one portfolio per group).</td>
</tr>
<tr>
<td>Consultation</td>
<td>Consultation with teacher as facilitator and Council representative for possible solutions to parking problem. Conference logs can be kept and used by groups for building approval process.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Students analyze their design and then create a PowerPoint presentation addressing their solution to the design challenge.</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>Students will give constructive feedback through the use of peer assessment. Constructive and explanatory judgments can be made by peer and self-evaluation to highlight possible areas of improvement and perspectives from different viewpoints e.g. environmentalist and cultural views.</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>Students consider on the spot improvisations to self-assess and evaluate their technology process with the use of testing results over time and reflection sheets.</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>By looking back on initial outcomes of the criteria sheet students ensure that all criteria has been implemented and meets their design through the use of ticking in each box. Teacher designs criteria sheet in conjunction with students viewpoints.</td>
</tr>
</tbody>
</table>

Context

<table>
<thead>
<tr>
<th>Context:</th>
<th>Description:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal</td>
<td>Students work towards a product that will suit the personal needs of the relevant members they are providing for by considering their own opinions as well as those of others.</td>
</tr>
<tr>
<td>Communities</td>
<td>Car parking has major implications for the day to day life and organizations of a community. The students will reflect upon the needs and requirements of the intended users of this facility and other stakeholders who live in the area.</td>
</tr>
<tr>
<td>School</td>
<td>Improving the institutional facilities of the university will in turn provide better educational opportunities for current and future tertiary students.</td>
</tr>
<tr>
<td>Global</td>
<td>Through investigations students will discover that parking of vehicles is an issue in urbanized areas all around the world. Students will study some of the innovations in car parking taking place in foreign countries.</td>
</tr>
<tr>
<td>Business</td>
<td>Students will consider the needs of the consumer (pricing, conditions of use) as well as working to a budget and timing limitations of construction companies.</td>
</tr>
</tbody>
</table>

Management
Managing people - Students work together in small groups practice cooperation and communication as well as peer assessment. The students must go through each step together
Managing resources - Materials are, collected, collated and utilized by the group to best provide for their design. Students administer each other in an organised fashion and seek trades people with expertise and other human resources to help with their challenge.
Managing opportunities - Creativity and innovation are encouraged and imagination should be provoked at any possible opportunity.
Managing constraints – Students will have a budget plan in place that is closely monitored so that they do not spend in excess of the allocated $10. Students will work to a time constraint that is proportional to that of architects, builders and contractors.
Footy Fever - Carly Day and Brett Pamenter

Design Challenge: Footy Fever
And the winner is……..Melbourne, Australia! Australia has won the right to host the 2014 FIFA World Cup. You have been selected as part of a team that will design and construct a new stadium for this prestigious event. While Melbourne boasts an unrivalled sporting culture, it also has inconsistent and unpredictable weather. Therefore your stadium design must incorporate a retractable roof to ensure the success of this global sporting event. Your model must be built within the parameters of 450mm x 450mm x 300mm and costs must not exceed $10. Your group will then give a 10 minute presentation of your product. Go the Socceroos!!

Outcomes, Levels and Strands:
This project requires students to demonstrate outcomes at a Level Four standard from both the Technology Practice and Materials strands:

TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.

Activities:
Investigating
Students are divided into groups with each group member assigned a role (e.g. marketing consultant, production manager, and accountant). The marketing consultants from each group come together to form an expert group, sharing ideas and strategies. The marketing consultants then report back to the group with their new knowledge and ideas. The production manager meeting follows, and finally the accountants. At the end of this activity, all students have numerous ideas for their stadium. This teaching strategy is called ‘Jigsaw’.

Ideating
Role play teaching strategy. As a follow on from the previous activity, students are given a template showing the format of a design proposal and in their groups develop a proposal for their stadium to be presented to a panel. The panel may include a member of the Australian Institute of Sport, Property Developer and the Minister of Industry, Tourism and Resources.

Producing
Individually, students produce sketches and drawings of possible stadium designs. In consultation with the teacher, students identify strengths of group members and allocate roles for the production process accordingly. Students then follow a sequence of steps to build their model (improvising where necessary). Finally the group will produce a Power Point slideshow or Web page to aide the oral presentation of their model.

Evaluating
A group logbook will be kept to record each member’s contributions (both attempted and completed) to the design or production of the model stadium. The group will discuss the process involved in building the model and question their peers to gain opinions of how appropriate their design features were for the design challenge.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Level, Strand, Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Reading and Viewing CR 4.2 When reading and viewing, students identify how aspects of subject matter have been selected to appeal to different groups.</td>
<td>Investigating</td>
</tr>
<tr>
<td>Science</td>
<td>Natural and Processed Materials 4.3 Students examine and assess ways that materials can be changed to make them more useful.</td>
<td>Producing</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Number 4.2, 4.3 Students identify and solve addition and subtraction (and multiplication and division) problems involving whole numbers and common and decimal fractions, percentages and rates, selecting from a range of computation methods, strategies and known number facts</td>
<td>Producing</td>
</tr>
<tr>
<td>The Arts</td>
<td>Media 4.2 Students select media forms and apply technologies to construct and present media texts to a target an audience</td>
<td>Producing</td>
</tr>
</tbody>
</table>

Assessment Ideas:

<table>
<thead>
<tr>
<th>Technique</th>
<th>Anticipated Evidence</th>
<th>Technique</th>
<th>Anticipated Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>TP 4.1</td>
<td>Consulting with students</td>
<td>TP 4.3</td>
</tr>
<tr>
<td>Work Samples</td>
<td>TP 4.2</td>
<td>Peer assessment</td>
<td>TP 4.4</td>
</tr>
</tbody>
</table>
Context:

Community- Students consider the benefits and effects this design challenge will have on the local and broader communities.

Global- Students identify that soccer is one of the few truly global sports that can be played by anyone in the world.

Personal- The design challenge fosters specific skills such as problem solving, decision making, critical thinking and improvisation.

Business- The design challenge provides opportunities for students to take on roles from the business world and also identify business opportunities that the stadium would provide for others.

Appropriateness:

Aesthetic- Is the final model pleasing to the eye and does it reflect a realistic view of a real world stadium?

Functional- Is it a working model? Does the model incorporate a retractable roof? Have the design parameters been followed?

Economic/ Environmental- Has the budget of $10 been strictly adhered to? Have recycled materials and resources been considered in the construction of the model to help stay under the budget?

Ethical/ Cultural- Will your design offend or exclude any groups, cultures or people with disabilities?

Resources:

Threaded rod: $5.10. PVA Glue: $2.50. Paddle Pop Sticks: $2.00. Reaching completion: Priceless!

Management:

People- Students work collaboratively with their group and teacher to determine their individual jobs to efficiently complete the task, encouraging an even distribution of workload amongst group members. All students must contribute to a supportive classroom environment and will be aware of the rules of participation during group work. Students will identify and minimise potential safety hazards for themselves and others, then adopt safe procedures and practices.

Resources- Students will work in groups within a designated classroom space and wet area that allows for safe production practices. Construction of the model will be done at school in school hours. The purchase of additional resources required for the model can be done outside of school hours, keeping in mind the $10 budget.

Opportunities –

Making decisions and solving problems, communicating and negotiating with others, planning, managing and organising action, reviewing and assessing.

Students develop ideas and strategies for gaining maximum impact of their design ideas and products.

Constraints-

Sequencing of stages and setting goals, students develop skills, knowledge and practices relating to budgeting. Students take into account how well they have met audience needs.
The Desktop Toy Challenge - Kate Boyd and Kylie Maule

Design Challenge: The Desktop Toy Challenge
It has come to your teacher’s attention that your desk and tidy tray do not meet the storage needs of all of your necessary school items. Therefore you are invited to put on your ‘Inventors Hat’ to design and create a suitable and functional desktop tidy to store all of your personal items. You will need to think creatively to construct your desktop tidy from recycled materials and can spend no more than $10. The design of your desktop tidy and what you will store in it is completely up to you; however you must include your name and a place to insert your photo. Consideration also needs to be given on the size of your desk, so your desktop tidy must be no larger than 450mm x 450mm x300mm.

Once completed, your class will then vote for their favourite top 4 desktop tidy designs, with the winners receiving a professional drafted copy of their design drawn up by a graphic designer. Students will then be divided into four groups to create a marketing plan to present to a panel of 3 judges (your principal, librarian and a local business owner) selling your nominated desktop tidy.

Outcomes, Levels and Strands:
TP 2.1 Students organise knowledge, ideas and data about how needs and wants might be met and use this information when meeting design challenges.
TP 2.2 Students generate design ideas, acknowledge the design ideas of others and communicate their design ideas using annotated drawings that identify basic design features.
TP 2.3 Students identify sequence and follow production procedures to make products of their own design.
TP 2.4 Students consider initial design ideas with final products and give reasons for similarities and differences.
INF 2.1 Students explain the purposes of different forms of information and describe how these are used in everyday life.
INF 2.2 Students use simple techniques for accessing and presenting information for themselves and others.
MAT 2.1 Students match the characteristics of materials to design requirements.
MAT 2.2 Students select and use suitable equipment and techniques for manipulating and processing materials.
SYS 2.1 Students identify and describe the order of components in familiar systems.
SYS 2.2 Students combine components to assemble systems in order to meet their needs and the needs of others.

Activities:
Investigation:
• Students use a variety of resources such as magazines, catalogues and the internet to research different types of storage ideas and solutions. Then create a collage using these pictures/drawings.
• Draw up a table, and identify what items you use most within a school day
• Interview one person in the school (a teacher from another classroom or a person in the school office) about their desktop organisation.
• Evaluate 3 different desktop tidy’s using a criteria sheet on their effectiveness.

Ideation:
• From their table, students identify which items they would use in their desktop tidy.
• Students give consideration to the different physical characteristics of each of the items they wish to store in their desktop tidy.
• Students identify appropriate recycled materials around the classroom and at home that could be used to construct their desktop tidy.
• Students will sketch a proposed desktop tidy, labelling each section and the items they will store in it.

Production:
• Students will develop a time management plan that outlines completion dates for each stage (E.g. Collection of recycled materials.)
• Students will bring in all the materials required for desktop tidy construction
• Teacher will instruct students of safety considerations in relation to constructing the desktop tidy using tools such as spray paint, hot glue guns, sharp materials, etc.
• Students construct their desktop tidy.

Evaluation:
• Students explain to class how they built their desktop tidy, material improvisation, results of evaluation to gain their specific concepts and ideas, and an explanation to why their constructed model is appropriate.
• Each desktop tidy will be displayed in the class, and students as a whole class, critique each model.
• Students will be given opportunity to vote for their favourite four desktop tidy’s, and the winners will receive a professional drafted copy of their design drawn up by a graphic designer.
• Students work in groups to design a marketing plan for their nominated desktop tidy model to present before a panel of judges.

Assessment:

<table>
<thead>
<tr>
<th>Assessment Technique</th>
<th>Sources of Evidence</th>
<th>Recording Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Group work and individual</td>
<td>Anecdotal notes, checklists</td>
</tr>
<tr>
<td>Consultation</td>
<td>Individual and whole class discussion of results and concepts</td>
<td></td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Student work samples and completed design challenge</td>
<td>Student workbooks, worksheets, and presentations</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>Students evaluating and voting for the top four desktop tidy designs</td>
<td>Student devised criteria sheet</td>
</tr>
</tbody>
</table>
**Context:**

**Business**- Students learn business skills of marketing and selling.

**Personal**- Students learn the importance of organisation, how to create a model from recycled materials, how to evaluate different products, how to communicate in groups and how to market a product.

**Communities**- Through the design of their desktop tidy, students learn about organisation and recycling which creates the opportunity for them to use these skills in the greater community. Student’s parents or family members may also assist in the design challenge or in and around the classroom.

**Industry**- Community industry workers may be involved within the classroom to assist the students, to give them ideas, or to be on the panel of judges.

**School**- This design challenge has great relevance to school because it is something the students need and can use everyday and has a purpose.

**Appropriateness:**

**Functional**- Students are required construct a desktop tidy which function to hold the item previously identified.

**Aesthetic**- Students are required to design and construct a desk top tidy that is aesthetic pleasing and appropriate for the school environment.

**Economic**- Students learn how to budget and make use of recycled materials.

**Environment**- Students are required to consider environmental implication of their desk tidy construction and are encouraged to use as many recyclable materials as possible.

**Cross curricular Links:**

<table>
<thead>
<tr>
<th>KLA</th>
<th>OUTCOMES</th>
<th>ACTIVITIES</th>
<th>EVIDENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>Measurement 2.2</td>
<td>Students identify and estimate which of the items in their tidy tray they use most each day and how often they would use them. This information is recorded on a table the students then spend 2 days recording and analysing the results.</td>
<td>Samples of students work will be collected and analysed for participation, understanding and results</td>
</tr>
<tr>
<td></td>
<td>Chance and Data 2.1 2.2</td>
<td></td>
<td>Consultation with students individually to discuss findings.</td>
</tr>
<tr>
<td></td>
<td>Space2.2</td>
<td></td>
<td>Whole class discussion/ comparison of results.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>During the production process of the technology challenge students are required to fill in a time line for the completion of design challenge stages. Students are also required to work within the size/budget constraints of the design challenge which requires the application and understanding of measurement and space strands of the math syllabus.</td>
<td>Teacher constructs large table to display results which will be displayed in the classroom. (Each student contributes own results to class total).</td>
</tr>
<tr>
<td>Science</td>
<td>Science and Society 2.2</td>
<td>Students investigate and evaluate other desk storage systems. Consideration is given to the quality of construction, functionality of the design and types of materials used</td>
<td>Samples of students work will be collected and analysed for participation, understanding and results</td>
</tr>
<tr>
<td></td>
<td>Natural and Processed Materials 2.3</td>
<td></td>
<td>Consultation with students individually to discuss findings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Whole class discussion/ comparison of results.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anecdotal notes taken of student participation and results</td>
</tr>
<tr>
<td>SOSE</td>
<td>Systems Resources and Power 2.3</td>
<td>Students are required to work in a group to design a marketing plan for a desk top tidy.</td>
<td>Observations and Checklist will be used to record individual contributions and overall group dynamics</td>
</tr>
<tr>
<td>Art</td>
<td>Visual Art 2.1</td>
<td>Students make images/sketches of their model and then build their desktop tidy. Students present a marketing plan, using clear voice and movement so they can be seen, heard and understood</td>
<td>Teacher makes anecdotal records of each student’s progress, and a final grade of the completed model. Marked using a criteria sheet developed by the students</td>
</tr>
<tr>
<td></td>
<td>Drama 2.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Level 2 – Speaking and Listening</td>
<td>Evaluation of examples of desktop tidy’s, creating criteria sheets, devising marketing plan, presenting marketing plan</td>
<td>Anecdotal notes taken of student’s progress, checklists, criteria sheet.</td>
</tr>
<tr>
<td></td>
<td>– Reading and Viewing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>– Writing and Shaping</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Resources:**

<table>
<thead>
<tr>
<th>Resources</th>
<th>Cost (if applicable)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balsa Wood Box</td>
<td>2.00</td>
</tr>
<tr>
<td>Wooden Letters</td>
<td>1.45</td>
</tr>
<tr>
<td>Paint</td>
<td>3.50</td>
</tr>
</tbody>
</table>

**Management:**

**Managing People**- Students are required to manage people in a variety of contexts which include
1. Interviewing school administration staff
2. Participating to group discussion and decisions regarding market of product
3. Contributing to whole class discussions regarding results from research and evaluation.

**Managing Resources**- Students are required to collect recyclable material to contribute to the construction of their desk top tidy.

**Managing Constraints**- Students are required to manage numerous constraints throughout the design challenge which includes:
1. Size students are to consider the size of a school desk when designing their desk tidy and therefore must limit the size to 2. Budget students are only permitted to spend a total of $10 on material used to construct the desk tidy.
2. Size students are encouraged to use as many recyclable items as possible. Teachers will supply resources such as glue and glue gun, paint and other specialised construction materials and tools.
3. Time students are required to manage time by completing stages of the design challenge by previously specified dates.
Design Challenge: Top Secret Spy Gadgets

Your challenge as 00 Agents is to design a gadget that may be used on an upcoming mission to make it safer and easier! The rules... your budget must not exceed $10 and the finished product must be built within the parameters of 450mm x 450mm x 300mm.

Outcomes, Levels and Strands:

Technology Practice
TP3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP3.4 Students test and judge how effectively their own or others’ processes and products meet the design challenge.

Information
INF3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.

Materials
MAT3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT3.2 Students select and use suitable equipment and techniques to combine accurately in order to meet design requirements.

Systems
SYS3.1 Students identify and describe relationships between inputs, processes and outputs in systems.
SYS3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:

Investigation
Students are to draw research from multiple sources such as:
- Internet
- Books
- Magazines
00’s gather a broad knowledge of how materials, systems and technology are used in current photography.
00’s engage with the most practical materials, systems and technologies that are involved with pinhole cameras and photography practices.
00’s are also to investigate covert operations and the art of spying through watching various pg rated movies ie. James Bond, Cody Banks.

Ideation
00’s brainstorm and complete a PMI for features of design and characteristics that the cameras will contain to enable to accomplish their covert operations/ missions.
00’s will sketch a design of their cameras listing all the secret and hidden spy features (00’s may choose to modify).

Production
00’s will ascertain top secret government materials that will best suit their covert operations. These materials used must be perceived to be of a civilian origin and fit the profile of everyday items that will not draw attention in obscure places.
00’s will follow protocol listed at http://users.rcn.com/stewoody/makecam.htm
00’s will add their own top secret features to the camera remembering the appropriateness to their mission.

Evaluation
00’s will reflect on materials and systems used and give a 1 minute presentation to their fellow 00 cadets.
00 cadets will then have the chance to ask questions by hot seating in groups of four or five about the uses and effectiveness of the camera’s ability to function and ascertain vital information on missions.
Questions may include quality of materials, materials ability to camouflage/ conceal camera, attributes of design, etc.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level, and Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Speaking and Listening Op 3.1 Reading and Viewing Cu 3.2</td>
<td>Students give oral presentation. Students keep a design journal. Students listen to guest speaker</td>
</tr>
<tr>
<td>Mathematics</td>
<td>S3.2</td>
<td>Students plan and consider: Budget Constraints, Money handling, Scale Drawings, Spatial Elements, Measurements and Conversions, Time management</td>
</tr>
<tr>
<td>Mathematics</td>
<td>M3.1</td>
<td>Students dispose of chemicals correctly after developing film from their pinhole cameras.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>M3.2</td>
<td>Students investigate how a basic pinhole camera works. Students record the physical and chemical changes observed during the developing of film from the pinhole camera.</td>
</tr>
<tr>
<td>SOSE</td>
<td>PSD3.6</td>
<td>Students design and construct model.</td>
</tr>
<tr>
<td>Science</td>
<td>Energy and Change 3.2 Natural and Processed Materials 3.2</td>
<td>Students discuss the correct handling and operation of tools and materials. Students assign tasks and designate an equal share of the workload to all group members.</td>
</tr>
</tbody>
</table>
Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment Technique</th>
<th>Instruments:</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Anecdotal records; anticipated evidence statements or criteria sheet; work samples; checklists.</td>
<td>Teacher uses checklist to assess learning outcomes demonstrated by students.</td>
</tr>
<tr>
<td>Consultation</td>
<td>Conference logs (in design journal); progress chart; student design folio.</td>
<td>Teacher discusses students work and progress with students.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Design journal; group discussions; presentations; works samples.</td>
<td>Design Journal and work samples assessed for evidence of learning.</td>
</tr>
<tr>
<td>Self- and Peer Assessment</td>
<td>Peer and self assessment sheets; design journal; reflection sheets.</td>
<td>Students give each other constructive feedback on their design and presentation.</td>
</tr>
</tbody>
</table>

Context

*Personal:* Group work promotes the growth of sound interpersonal skills, and the design challenge fosters personal skills such as problem solving, decision making, time management and critically thinking.

*School:* Through group work students will work collaboratively with their peers, teachers and the wider school community.

*Communities, Home and Family:* Students consider how technology affects home, family and the wider community.

*Appropriateness*

*Aesthetic:* Is the gadget appealing to other spy agents? Is it built to the right proportions?

*Economic:* Does the product stay within the $10 budget?

*Environmental:* Are the materials used in the design environmentally friendly?

*Functional:* Would spies feel safe using this gadget on a mission?

*Ethical:* What implications does this gadget have on the wider community? What would happen if this gadget fell in the wrong hands?

Resources

**PINHOLE CAMERA Materials – Recycled/Pre-owned and found:**
- Clean empty can (or cardboard box) in excellent condition (no tears, dents or holes; old scissors; Stanley knife; flat black spray paint (not gloss); black electrical tape; sewing needle; manila file folder; light cardboard; rule; fine sandpaper; aluminum soft drink can.
- Dark Room: Guest speaker on photography and dark room safety; water for stop bath; plate of glass (size of photo paper); developing trays (cooking trays); 15watt bulb (can use normal light).
- Materials Bought:
  - 760ml of Kodak Dektol Developer $2.10; 100ml of Fixer $1.90; 12.7 x 17.8cm matt resin coated photographic paper (4 sheets $2.48); can of soft drink (aluminum can) $2. TOTAL $8.48

Management

*Managing people:* Within their groups students collaboratively discuss and determine their individual jobs in order to complete their task. All students at the commencement of the challenge will be aware of the rules of participation in group work and the safe practices that are required.

*Managing resources:* Students will be provided resources at school however they will also be encouraged to find materials externally. Students will work as a group in the tech room or a designated space in the classroom or school (darkroom) that allows for safe, efficient practices.

*Managing opportunities:* Student will be given access to resources (people, materials and time) to allow learning to occur.

*Managing constraints:* Students will need to complete their designs in the designated time. They may need to negotiate within their group and others for resources. Students must stay below budget.
Activities Inspired through the challenge

The design challenge includes the organisers related to technology practice namely:

- **investigation** (by means of a self-developed survey students will determine what other students in the school would consider as a physically fun recess attraction, they will then collate the data collected, establishing its relevance when meeting design challenges, and through means of research, and advice from both school authorities and other related professional and personal bodies, choose by a democratic school vote the type of activity-oriented program that would cater to most if not all needs of the students in the school; choice: playground obstacle course);

- **ideation** (a student committee is formed to brainstorm ideas and generate design challenges that would cater to all needs and manner of students present in the school; Students will then access various authorised websites to familiarise themselves with functionality and accessibility of the plans developed from the collated data results obtained from the survey. Students brainstorm ideas on what sort of equipment will be necessary to carry out the design challenge, its organisation, accessibility of materials, safety issues, cost, time taken to build/ construct/ put together the challenge and need for extension of the original plan or modification of the same, if necessary; and how it would be used to benefit all students covering all aspects of appropriateness and accessibility);

- **production** (several committees** are formed by the students and, with the help of the school authorities, and professionals positioned to cater to their design challenge, students cooperatively produce and develop a design on paper as an original blue print allowing for extension/ reduction in the original plans to be modified on the basis of expert opinion (choice of an expert was based on quotes, interviews, accessibility and availability of expert if needed to change/modify design on site), advice and guidance);

- **evaluation** (once the committees and the design challenge finally come together, students as a team critically analyse whether their design challenge meets all aspect of appropriateness, caters to management constraints, fairness of usage, would work on an actual school playground setting, baring hitches).

Information organisers related to the design challenge would allow for the students to describe the advantages and disadvantages of different sources and forms of information collected during both the investigation and ideation stage (for e.g.: certain modifications placed on the course modified to cater for wheelchair access in the case of the second tower and to cater for vision impaired and hearing impaired students in the area of the elephant splash station -beeping and vibrating step-on disks); the students then use the information collected and the ideas generated, modifying them where necessary in order to present them for different purposes to different audiences; At the Materials stage, students choose appropriate materials best suited to fit the design challenge products and its users, with advice and guidance from the appropriate experts and authorities, students combine suitable equipment and techniques in order to meet the design requirements; At the Systems stage, the students will identify the relationship between the inputs, processes and outputs in the design challenge at the presentation stage and being open to new ideas from the audience, modify their design before it is assembled and trialled for the final time.

Outcomes, Levels and Strands: The design challenge focuses on the technology core learning outcome of the Level 3nd includes all the strands of Technology practice: TP3.1, TP3.2, TP3.3 and TP3.4; Information: INF3.1 & INF3.2; Materials: MAT3.1 & MAT 3.2 and Systems: SYS3.1 & SYS 3.2 (as explained in detail under the paragraph titled Activities Inspired through the challenge).

Crosscurricular Learnings include:

- **Mathematics** M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.

- **English** Cu 3.1 When speaking, students: • use aspects of subject matter and resources to construct positive or negative representations of ...things (design challenge) to achieve their purposes.

- **Cursive Writing** Cu 3.2 When reading and viewing, students: • interpret subject matter by making connections between directly stated information to identify main ideas and supporting details (research of data).

- **Composition** Cu 3.3 When writing and shaping, students: • research familiar and unfamiliar ideas and information to develop a topic or argument that uses some elaborated ideas with supporting details

- **Design** Op 3.3 When writing and shaping, students: • use visual and audio resources to develop subject matter and add interest the Arts ME 3.1 Students combine and manipulate media languages and technologies to construct intended meanings.

- **Presentation** ME3.2 Students present media texts to a specified audience using presentation techniques associated with particular media forms.

- **Visual Arts** VA3.2 Students make and display images and objects, understanding the functions of informal and formal display.

- **Science** Science 3.1 Students collect data and make and test inferences to describe the effects of forces (such as the crank shaft as in the case of the flying fox) on the motion and shape of objects.

- **Sustainable Practice** SOSE PS 3.2 Students create and undertake plans that aim to influence decisions about an element of a place.

- **Safety and Risk** SRP 3.3 Students apply the principles of democratic decision-making in cooperative projects.

Assessment Ideas:

1. Committees such as: organising, monitoring, safety issues, school rule link, roster system, cleanliness and hygiene, maintenance and engineering, sponsorship organising…
The age of the students (11-13 y.o., Year 6), and the nature of the challenge will determine the assessment techniques used. Checklist (survey- make sure it covers all aspects of appropriateness, reports on investigations, research projects undertaken, sketches and drawings/blue prints of design ideas, production proposals, cooperative and collaborative workmanship, progress charts, etc), design briefs and plans, portfolios and student folios, quality of the oral/visual/written presentations (computer generated presentations, sequential manner of presentation, persuasive speeches, appropriate imagery, principles of CRAP), quality of the model of the design product – its layout, appropriateness, enhanced features, creativity involved in the selection and designing, catering for management constraints, catering to needs of whole school as well as the community (aesthetic appeal).

Resources:
- Board $5.50 (purchased initially for use as shelf, goal never achieved)
- Paddle pop sticks & match sticks $3.50; metal coat hanger (domestic item)
- Broken abacus (beads) and toys (recyclable)
- Recycled plastic sheet and door mesh from old security door
- Paint, glue and blue tack (technology laboratory resources) TOTAL COST $9.00

Context:
The design challenge situates itself in a school context; it includes aspects relating to physical fitness and recreational attitudes. It also accommodates the need for present day students to challenge their physically inactive lifestyles and make fitness fun, healthy and accessible to all within the school, community and global context.

Management:
Management of people: the design challenge requires students to work in collaboration and cooperative partnerships and teams, both during the process of investigating, ideating, producing and evaluating as well as, once the design product has been put into operation (organisation of access, management of assessability, monitoring of people and situations, assisting of disabled students where necessary, management of risk and safety issues, management of issues relating to hygiene and cleanliness, detailing of penalties to be implemented depending on the mildness/severity of inappropriate behaviour conducted on the course).

Management of resources: the students need to become aware of industry standards, school rules, safety and risk issues relating to the design challenge/product, and how these assist in maintaining standards and protecting consumers (namely the students themselves). Such awareness could be obtained through research, information from school and local authorities and advice and guidance from professional and trade bodies.

Management of opportunities: students use imagination, initiative and creative innovation in designing their challenges, they take responsibility in being positive, flexible and open to others ideas and critiques when it comes to decision making, problem solving, planning, managing and organising committees, and communicating and negotiating with others in all matters relating to managing resources, people and constraints.

Management of constraints: (time & opportunity constraints) making arrangements for different days of access to ensure that all year levels get the opportunity to use the obstacle course and that all students need to go through the course ASAP, time slots allocated for monitor duty and aide duty for students from both Year 6 and 7, ensuring that the area is undercover so accessibility is maintained even during wet weather, catering for disable students; ensuring all risk and safety issues are covered; (budget) organising 3 or more quotes and ‘word-of-mouth’ recommendations to influence the choice of professional necessary to conduct aspects related to the construction and maintenance of the obstacle course; (capitalisation) such a design challenge could be established in schools all over the country, founded on needs-based modifications, it could cater to public park needs as well as shopping complexes and fast food play pen situations.

 Appropriateness: the design challenge caters for: Aesthetic appropriateness (in the appeal, function, colour & layout); Cultural appropriateness (in recognising the need for physical fitness in primary school children); Economic appropriateness (the health benefits easily outweigh the financial costs of the products, still costing was based on 3 or more quotes, budgeting -includes sponsorship collecting- quality of workmanship was also considered, based on previous projects viewed); Environmental appropriateness (the benefits of the design product was to produce a healthy and active society, while utilising products that do not pollute or degrade the environment); Functional appropriateness (the product caters to use of both upper and lower body muscle movement in a fun and exciting manner); Social appropriateness (the product was based on an escalating need/problem that existed not only in a local (school) but in a social and global context as well).
Design Challenge: Sustainable and Renewable Energy
You and your partner have been asked to provide 'nibblies' for the class while presentations are being conducted. Due to ongoing debates regarding the dangerous carcinogenic emissions released from conventional cooking devices such as, electric and gas ovens, and with growing suspicions about the health risks caused by microwave ovens; you and your partner are required to cater for the class using an alternative energy source.

To date there has been no health scares associated with solar cooking methods... A SOLAR OVEN!!!

Outcomes, Levels and Strands:

<table>
<thead>
<tr>
<th>Technology Practice</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TP4.1</td>
<td>Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.</td>
</tr>
<tr>
<td>TP4.2</td>
<td>Students generate design ideas through consultation and communicate these in detailed design proposals.</td>
</tr>
<tr>
<td>TP4.3</td>
<td>Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.</td>
</tr>
<tr>
<td>TP4.4</td>
<td>Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Information</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>INF4.1</td>
<td>Students analyse sources and forms of information and match these to the requirements of design challenges.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT4.2</td>
<td>Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Systems</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS4.1</td>
<td>Students identify and explain the logic of systems and subsystems.</td>
</tr>
<tr>
<td>SYS4.2</td>
<td>Students incorporate feedback to refine and modify systems and/or subsystems.</td>
</tr>
</tbody>
</table>

Activities:
Investigation - gathering knowledge, ideas and data to meet design challenges
Investigate the possibilities of using a solar oven to produce food. What foods can be cooked? What would a solar oven look like? How would one work?

Ideation - generating and communicating ideas that meet design challenges
Brainstorm (with partner) design ideas and improvements. Make sketches of ovens showing features. Develop a flow chart for production. Identify possible resources and create a resource list. Identify possible foods that could be produced. Make a recipe list.

Production - making products to meet design challenges
Working with partners, students will produce a solar oven by following their flow charts. Students will then test the effectiveness of their design by producing nibbles for the class presentation.

Evaluation and Teaching Strategies - judging the appropriateness of design ideas, processes and products when meeting design challenges
Students will present their final model to the class outlining their design process and the features of the oven. Students will discuss how their design changed over the course of the challenge and any special modifications made. Students will be peer assessed on appropriateness of nibbles. Students will complete peer evaluations of classmates' designs to be included in Technology Project Folio.

Context:
Global: Students identify the need to look at alternative energy sources and uses.
Community: Students attempt to design a product that addresses the issues of sustainable resource management.
Personal: Students develop problem solving, decision making and cooperation skills.
Industry: Students research past, present and future production of products with similar purposes.

 Appropriateness:
Aesthetic: Will the final product be appealing and eye catching in design?
Cultural: Which cultural groups would get the most benefit from the use of this product? I.e. Southern Vs Northern hemisphere.
Economic: Will the product prove to be a viable resource that can be used again?
Functional: Does the product work? Does it gather and maintain required heat?
Resources:
Polystyrene box, cardboard boxes, duct tape, glue, foil, stanley knife, black paint, red paint, red glitter paint, oven bags*, thermometer, baking rack, baking tray, wire.
Ingredients: chocolate*, marshmallows*, almonds, crushed peanuts, desiccated coconut, snakes*. Total cost: $9.63

Management:
Managing people
All students are aware of the rules for group work and safe practices when working technologically prior to the commencement of the challenge.
Students to work in pairs to gather information and ideas for most advantageous design specifications, once initial findings are gathered the entire class works collaboratively to share ideas.

Managing resources
Students will be provided with selected resources at school but are ultimately responsible for the collection of their own groups’ materials and for designs. Construction will take place in the technology area.
An ingredients list will be submitted to the teacher prior to the commencement of the challenge.
Managing opportunities
Students will have access to a variety of web based and hard copy resources throughout the challenge pertaining to the subject and challenges possibilities. Teacher assistance and guidance will be available throughout every stage.

Managing constraints
Students need to adhere to the time, budget and dimension requirements associated to the challenge criteria.

Cross curricular Learning:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level and Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>Earth and Beyond 4.3 Students summarise information to compare ways in which different communities use resources from the Earth and beyond.</td>
<td>Identify different forms of energy that can be transformed into heat energy (e.g., mechanical, chemical, nuclear, or electrical energy). Identify the components of a system that are designed to transfer heat energy (e.g., in a room, a house, or a shopping centre) and describe methods for conserving energy within that system. Students research current trends in use of fossil fuels as an energy source. Students research solar energy and its possible uses. Students research the changes that occur when foods are heated.</td>
</tr>
<tr>
<td>Energy and Change 4.2</td>
<td>Students collect and present information about the transfer and transformation of energy (including potential and kinetic energy).</td>
<td></td>
</tr>
<tr>
<td>Energy and Change 4.3</td>
<td>Students present alternative ways of obtaining and using energy (including energy from the sun and from fossil fuels) for particular purposes.</td>
<td></td>
</tr>
<tr>
<td>Natural and Processed Materials 4.2</td>
<td>Students identify patterns in the types of change that take place in materials.</td>
<td></td>
</tr>
<tr>
<td>Natural and Processed Materials 4.3</td>
<td>Students examine and assess ways that materials can be changed to make them more useful.</td>
<td></td>
</tr>
<tr>
<td>Natural and Processed Materials D4.4</td>
<td>Students recognise, and report on, the environmental impact of some manufacturing processes.</td>
<td></td>
</tr>
<tr>
<td>Maths</td>
<td>Number 4.2 Students identify and solve addition and subtraction problems involving whole numbers and common and decimal fractions, selecting from a range of computation methods, strategies and known number facts.</td>
<td>Students design scale plans for a solar oven. Students record and measure variations in temperatures achieved within the oven, and make predictions about optimum times of the day an season to use the oven</td>
</tr>
<tr>
<td>Measurement 4.1</td>
<td>Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.</td>
<td></td>
</tr>
<tr>
<td>Measurement 4.2</td>
<td>Students read, record and calculate with 24-hour time and develop timetables and calendars to plan and organise events or activities.</td>
<td></td>
</tr>
<tr>
<td>SOSE</td>
<td>Place and Space 4.1 Students make justifiable links between ecological and economic factors and the production and consumption of a familiar resource.</td>
<td>Students will look at the cultural appropriateness of their choice of nibbles and discuss possible alternatives for differing cultures.</td>
</tr>
<tr>
<td>Home Economics</td>
<td>Home Economics Practice 4.3 Students use technology practice (as described in the Level 4 core learning outcomes of the Years 1 to 10 Technology Syllabus) in home economics contexts.</td>
<td>Students will need to plan and prepare ingredients for nibbles. Students will make their nibbles in their ovens. Students will modify ovens to accommodate their recipe.</td>
</tr>
<tr>
<td>Becoming Independent 4.3</td>
<td>Students select and manage resources to prepare foods that meet physical, social or emotional needs.</td>
<td></td>
</tr>
<tr>
<td>Becoming Independent 4.5</td>
<td>Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products. (Tech MAT 4.2)</td>
<td></td>
</tr>
</tbody>
</table>

Assessment Techniques
- Observation
- Checklists
- Observation notes
- Anecdotal note
- Consultation
- Conference with partner groups
- Focused Analysis
  - Checklists
  - Feedback sheets
- Peer and self-assessment
  - Peer evaluation sheets
  - Reflection sheets

Source of Evidence
- Students working co-operatively in groups
- Students constructing ovens from flow chart designs
- Discuss ongoing design difficulties and modifications with individual group member.
- Oral presentation and demonstration of model
- Group Discussions
- Flow chart
- Technology project folio
- Peer evaluation of oral presentation
- Evaluation of nibbles (taste testing)
- Self-reflection on design challenge
Design Challenge: An Attraction for All Ages
The brand new Five Star Ski Resort being built in town is in need of your assistance. The problem which is being experienced by the design team is that they cannot decide on an appropriate and entertaining attraction for the resort. Attractions are a vital aspect of the resort and it is often the deciding factor in tourists and customers choosing the resort to stay in. What they are asking is that you design a prototype for an attraction which will attract and entertain guests of all ages and cultures. The only constraint the designers have for you are that the model has to be 45cm x 45cm x 30cm and cost less than $10 to produce the rest is up to you. The winner will be asked to assist in the construction of the attraction and be given the penthouse suite for them and three mates to stay in for a week once the resort is completed.

Outcomes, Levels and Strands:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others' processes and products meet the design challenge.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:
Investigation:
Students would visit the site where the attraction is to be located on an excursion to get an idea of the scale which would have to be used. Students utilize the internet and other resources such as books and magazines to research attractions around the world from theme parks to resorts. Students would also use the internet and surveys to investigate which attractions are most popular and successful and analyze why. Students would also investigate colours and theme for attraction to help blend in with resort and surroundings and which materials blend together.

Ideation:
Using the information and data collected from research and investigations students brainstorm with each other to decide which attraction will be most appropriate and entertaining. Students would also consider which materials, colours and theme will be used when designing the attraction. Students would consider ways to keep the budget to a minimum by using recycled materials and also consider dimensional constraints. Students will have to consider safety precautions and ensure that the attraction is safe.

Production:
Once an attraction is selected students would plan by sketching and then using an ICT computer program such as Adobe Photoshop or Paint. Once plan is correctly drawn up students are to carefully choose and purchase materials to keep under budget. Students then decide on a sequence of steps to follow from planning to designing to presenting. The design is to be completed and produced to a high quality standard with all dimensions exact. Students would also construct a presentation and PowerPoint to present their design effectively.

Evaluate:
Students are to evaluate the design and ensure that constraints and budget have been met and followed. Also students would evaluate using a survey on the aesthetic appeal of the attraction. Students present to class and teacher describing every aspect in detail. Students would also evaluate each others input into the design.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activities</th>
<th>Outcomes, Levels and Strands</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SOSE</strong></td>
<td>Students would also use the internet and surveys to investigate which attractions are most popular and successful and analyze why. Students would visit the site where the attraction is to be located on an excursion to get an idea of the scale which would have to be used.</td>
<td><strong>Place and Space</strong> - PS 3.2 Students create and undertake plans that aim to influence decisions about an element of a place. PS 3.3 Students cooperatively collect and analyse data obtained through field study instruments and surveys, to influence the care of a local place. <strong>Systems, Resources and Power</strong> - SRP 3.3 Students apply the principles of democratic decision making in cooperative projects.</td>
</tr>
<tr>
<td><strong>PE</strong></td>
<td>Students will have to consider safety precautions and ensure that the attraction is safe.</td>
<td><strong>Personal Health</strong> - PH 3.3 Students identify potentially hazardous situations and demonstrate actions to respond to unsafe and emergency situations.</td>
</tr>
<tr>
<td><strong>Math’s</strong></td>
<td>The design is to be completed and produced to a high quality standard with all dimensions exact. Using the information and data collected from research and investigations students brainstorm with each other to decide which attraction will be most appropriate and entertaining.</td>
<td><strong>Measurement-Length, mass, area and volume</strong> - M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents. <strong>Chance and Data</strong> - CD 3.2 Students design a variety of data collection methods and use existing sources of data to organise data and create suitable displays.</td>
</tr>
<tr>
<td><strong>Natural and Processed Materials</strong></td>
<td>Students would also investigate colours and theme for attraction and which materials blend together.</td>
<td><strong>Natural and Processed Materials</strong> - NM 3.3 Students collect information to illustrate how combining different materials influences their usefulness.</td>
</tr>
<tr>
<td><strong>Science</strong></td>
<td>Students would also construct a presentation and PowerPoint to present their design effectively.</td>
<td><strong>Speaking and Listening</strong> - Cu 3.1 When speaking, students. Make choices of subject matter depending on audience, purpose and the medium.</td>
</tr>
</tbody>
</table>
When writing and shaping, students: Use visual and audio resources to develop subject matter and add interest.

**Writing and Shaping - Op 3.3**

**The Arts**

The design is to be completed and produced to a high quality standard with all dimensions exact. Students would also construct a presentation and PowerPoint to present their design effectively.

**Visual Arts - VA 3.1**

Students design, make and modify objects applying elements and concepts to construct intended meanings. **DVA 3.4** Students collaboratively make and display images and objects for a specific purpose with artists/designers/craftspeople.

**Media**

DME 3.4 Students apply digital technology to publish their media products in print or digital form.

**Assessment Ideas:**

**Observation:** Notes and feedback during all stages of the eight weeks using a checklist. Monitoring groups and individuals to ensure they remain on-task making sure timely progression of design and construction, also a checklist for behaviour.

**Criteria Sheet:** Criteria sheets could be used to assess learning outcomes and also group work.

**Self Assessment:** Final presentation. Student worksheet of a few set questions for self and peer evaluation of presentations

**Peer Assessment:** Students are given constructive criticism of peers work and presentation using questions and feedback.

**Focused Analysis:** Focus on all details of the design process on investigation, ideation, production and evaluation.

**Consultation:** Assessing group work and students individual contributions using anecdotal notes and checklists.

**Oral Presentation and Portfolio of work** could also be used as an assessment item.

**Context:**

**Business:** Students will work within the budget to ensure that the challenge remains cost effective.

**Leisure and Recreation:** Students will consider how technology provides entertainment.

**School:** Using group work students will gain confidence and learn how to work co-operatively.

**Personal:** The design challenge involves group work which helps students improve personal skills such as problem solving, decision making, time management and critical thinking.

**Appropriateness:**

**Aesthetic:** The finished design should be visually appealing and the colours should blend with surrounding colours.

**Cultural:** Students have to take into account cultural differences such as youth to old and English to French when designing.

**Economical:** The design process involves students to consider budgets constraints and time.

**Functional:** The finished device and the animation should be fully functional. It should meet the design challenge criteria.

**Social:** Students will work collaboratively, improving interpersonal skills, teamwork and good communication skills.

**Environmental:** Students use recyclable materials wherever possible, to minimise adverse affects on the environments.

**Resources:**

Students are encouraged to use recycled materials as much as possible. Using creativity students could obtain resources from home, school and community. If students use recycled materials from school, home and the community it will help them stay under the $10 budget and also to have a creative recyclable design.

**Management:**

**Managing people** - Students will need to be considerate of each group member and equally contribute to the investigation, ideation, production and evaluation of their design. They should co-operate with each other. Students are encouraged to complete the design and all of its components without the assistance of friends, teachers or family.

**Managing resources** - If students are to buy materials then it is suggested to shop around for cheaper materials and to steer clear of expensive plastics and metals. Wood and metal tend to be cheap and easy to obtain in shapes, colours and sizes.

**Managing opportunities** - Each group will be given the same amount of time to present their design, which will include sketches, videos and descriptions of materials. The presentation will also provide time for any peers to ask questions. The group will have time to describe any problems which they experienced along the way.

**Managing constraints** - Students are given an eight week period of time to complete the design and prepare a presentation. Students are also given a $10 budget and dimensional constraints which they will have to comply with during the design process.
A Festive Cheer for the New Year - Kara Lonergan and Jaime Perkins

Design Challenge: A Festive Cheer for the New Year
The Gold Coast is Australia’s fastest expanding city and Australia’s best tourist destination. Holiday goers from all over the world come to see the beaches, tropical rainforests, world class golf courses and world-famous theme parks. Over the New Year holiday alone, hotels in Surfers Paradise become booked out from visitors and locals alike celebrating the next notch on the calendar. In previous years however, some complaints have been made regarding the lack of entertainment provided in the leading up to the big twelve o’clock moment. The Gold Coast City Council needs you to design a countdown timer for the New Years celebrations. This timer must contain five entertaining reactions (eg. ball hitting domino, dominos falling in trail) all of which symbolise iconic images of Surfers Paradise and the wider Gold Coast City. The purpose of the countdown is for the last reaction to complete a circuit that will light up the Surfers Paradise sign in the centre of the suburb. The reactions must run for 10 seconds and be created to a 450mm x 450mm x 300mm scale. Money however is an issue due to most of the finances being dedicated to the fireworks and because of this, we wish for your model to cost no more than $10. Your model must be presented by September 12th for enough time to be given to use recycled materials for the life size version.

Outcomes levels and strands: Level 3, year 5
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
SYS 3.2 Students identify and describe relationships between inputs, processes and outputs in systems.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities
Investigation
Students Watch video sequences of chain reactions (i.e. Casper, Chitty Chitty Bang Bang, The Goonies, Playschool ‘word of the day’). Students draw design sketches of the chain reactions they witness. In rotational groups, students play games that include technological processes and chain reactions (i.e. Mouse trap, the Incredible Machine, Marble game). Students do their own research concerning cultural icons of the Gold Coast region.

Ideation
Students receive the design challenge. Working in groups of 2, students brainstorm ideas of chain reactions that they see in their own lives. This brainstorming occurs using a mind-map. Students then ideate design solutions using this contextual knowledge (e.g. Open a fridge, light comes on). Students sketch their design that they will use for the design solution, taking into consideration what Gold Coast icons they wish to incorporate. Students estimate the time that their chain reactions will take, keeping in mind the constraints of the design challenge (10 seconds). Students plan materials that will be needed for their design solution. Students detail costs, size proportions and requirements of their design solution.

Production
Students construct their design solution. Modification of their design solution may be necessary in order to meet time requirements. Documentation of these changes is required to monitor higher order thinking skills.

Evaluation
Students self evaluate their design solution, following a teacher-selected set of criteria. Students present their models to the ‘council’ (class board of teachers and parents) in a class competition. The council will provide constructive criticism based on the presentation the students have given and the product they have presented.

Crosscurricular Links

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcomes</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Cu 3.1</td>
<td>Students speak their design solutions to the ‘council’ and listen to constructive criticism (i.e. assessment item).</td>
</tr>
<tr>
<td>SOSE</td>
<td>PS D3.7 CI 3.1</td>
<td>Students do their own research concerning cultural icons of the Gold Coast region.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>N 3.1 N 3.2 M 3.1 S 3.2</td>
<td>Students add resource costs of their design solutions (calculating cash transactions). Students measure (using equivalent forms of standard units) to ensure that their product is to scale and within the size requirements. Students create plans for their design solutions, using a range of conventions.</td>
</tr>
<tr>
<td>The Arts</td>
<td>VA 3.1 DVA 3.4</td>
<td>Students create aesthetically pleasing products. Students design and produce their countdown timer for a specific purpose, to present to the ‘council’ board.</td>
</tr>
<tr>
<td>HPE</td>
<td>PHIC 3.3 EPD 3.4</td>
<td>Students identify risks in the process of designing and creating their countdown timers, and act appropriately to safety requirements. Students work in pairs; and communicate, cooperate, and collaborate as a team.</td>
</tr>
<tr>
<td>Science</td>
<td>SS D3.5 EC 3.1 EC 3.3 NPM 3.3 NPM D3.4</td>
<td>Students collect recyclable and non-recyclable materials to use in creating their countdown timers. Students test the usefulness of different materials combined together, and change their materials to obtain use of the most appropriate properties. Students trial and error their countdown timer to test the scientific experiments within their countdown timer (e.g. light trap, electric circuit, chain reactions etc.). Students prepare presentations to best ‘sell’ their products to the council. Higher order thinking occurs as students inform others of implications (i.e. ethical) of the scientific applications relevant to their countdown timer.</td>
</tr>
</tbody>
</table>

Assessment Ideas
Students prepare and conduct a presentation to the ‘council’ board (including teachers and parents) describing the process of designing and creating their countdown timer, and self evaluating the appropriateness, effectiveness, and efficiency of their
product. During this process, the entire class becomes involved as they peer assess individual products and presentations. Throughout the entire design challenge, students have individual design portfolios, which incorporate design sketches, costs, scales, materials, trials and changes, estimation beforehand, step-by-step diary, written self evaluation etc. This portfolio becomes a major form of assessment which documents the students' progress, abilities, and understanding of technological and Crosscurricular concepts, processes, values, skills, and strategies.

Context

**Personal:** during this task, students develop an understanding of how technology affects them personally. Students will relate with the design challenge as it affects their daily lives (living in the Gold Coast region). Students incorporate their personal ideas, wants, and needs in designing and creating the countdown timer.

**Community:** Students will have to consider the community views and attitudes concerning the Gold Coast countdown timer (i.e. appropriateness, effectiveness). Students can involve community members during investigation phase of learning (i.e. personal research- interviews, surveys, expert advice).

**Business:** In presenting their product to the 'council' board, students learn professional business techniques that will enhance their chances of successfully 'selling' their design solution.

**Home and family:** Students may take their design solutions home to work on as long as they can justify costs, size requirements, and personal construction of the product and presentation.

**School:** Student behaviour reflects the nature of the school. At all times, students uphold a professional manner when investigating, ideating, producing, and evaluating their design solutions.

**Leisure and recreation:** This design challenge enables students to design and create a countdown timer that will entertain the local community during a festive holiday of leisure and recreation.

**Appropriateness**

**Social:** Is the design solution accommodating to the entertainment needs of all groups of people within our society? (i.e. age, gender, ethnicity, disability, socioeconomic status etc.)

**Cultural:** Does the design solution incorporate cultural icons portraying what the gold coast has to offer?

**Functional:** Is the countdown timer functional? Does it fulfill all design challenge requirements (size, costs, time)? Do all the chain reactions work?

**Aesthetic:** Is the design solution aesthetically appealing to the Gold Coast community? Will it create the appropriate atmosphere for the New Years Eve holiday?

**Economic:** Is the design solution constructed within the budget of $10?

**Environmental:** Are recycled materials used where possible? Are the environmental aspects of the Gold Coast region incorporated within the countdown timer design?

**Resources**

- 2 cornflake boxes
- newspaper, egg carton, wire, permanent marker pen, biro, silver cardboard, wooden skewers, toilet roll, plastic drink bottle, fishing line, cork, masking tape, A4 white paper, marble, net from marble bag, pin board tack, coat hanger, sticky tape, ribbon dispenser, cling wrap roll, crayons, PVA glue, bottle cap, paint, staples, jingle ball, battery, plasticine ($1.99), switch ($2.50), light bulb ($3.49), wire ($0.45), screw ($0.25).

**Management**

**People:** Students learn how to effectively work within small groups (2-3 per group). The teacher should ensure that all group members are contributing equally and that appropriate social skills are utilised within and outside the classroom environment.

**Resources:** Students use resources found at home, at school, and in the local community. Students should receive equal access to resources (monitored by the $10 budget). The resources and design solutions can be stored at school or at home, depending on individual student preference.

**Opportunities:** Students are given the opportunity to design, create, and present their countdown timers to peers, parents and teachers. They are able to constructively assess their own and their peers' work. The teacher should ensure that all students have equal opportunity to access resources, obtain information, and spend time creating their design solutions.

**Constraints:** Students must ensure that they work within all assessment requirements- time (10 seconds countdown timer, and design challenge time limit), money (must not exceed $10), size (no larger than 450mm x 450mm x 300mm), **cultural icon aesthetic design** (Gold Coast culture), school policies (must not contain offensive messages and fulfill safety requirements), and age appropriate (student level).
Design Challenge: Green Day Tour Merchandise
Green Day is coming ‘Down Under’ at the end of the year and has asked you to design and create an innovative piece of merchandise that will promote their tour. They are looking for a younger and fresher approach that is appealing to the technological youth of today. You have a budget of $10 and the product can be no larger than 450mm x 450mm x 300mm. So put your thinking caps on because Green Day is counting on you.

Outcomes, Levels and Strands:
Technology Practice
TP 4.1: Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2: Students generate design through consultation and communicate these in detailed design proposals.
TP 4.4: Students evaluate design outcomes that are produced for touring and distribution plans.

Materials
MAT 4.1: Students describe how characteristics of materials affect ways they can be manipulated.
MAT 4.2: Students explain how materials and technological factors influence financial decisions.

Information
INF 4.1: Students analyse sources and forms of information and match these to the requirements of design challenges.

Activities:
<table>
<thead>
<tr>
<th>Investigation</th>
<th>Ideation</th>
<th>Production</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individually student’s research through books, the internet and magazines for merchandise items that are produced for touring bands and record this information in their design diaries. In their groups, students then consult their fellow peers about their findings and begin to decide which ones are viable and which aren’t. This information is recorded in their design diaries.</td>
<td>Within groups students begin to design their piece of merchandise through a detailed design proposal that includes sketches, cost of materials, production costs, recommended retail prices and distribution plan. This will then be presented to the class through a 15-minute oral presentation. Peers will be given the opportunity to give constructive feedback to the group through a PMI chart (plus, minus, interesting or in this case innovative).</td>
<td>Students begin to produce their piece of merchandise. As a group they need to evaluate the constructive feedback that was given by their peers and decide how to incorporate that within their piece of merchandise to enhance the product. While producing the piece of merchandise students draw upon each member of the group and their areas of expertise to construct their piece within the constraints. During both of these processes students need to be recording details such as modifications and job allocations or problems that arise in their design diaries.</td>
<td>All groups display their completed pieces of merchandise around the room, including their detailed design proposals and design diaries. All of the students then perform a walk through thinking about the PMI that was previously performed and how it may have changed now looking at the final product. As a whole class, students then discuss the different products and the PMI chart that the students would have just thought about.</td>
</tr>
</tbody>
</table>

Crosscurricular Learnings:
<table>
<thead>
<tr>
<th>Key Learning Area</th>
<th>Outcome</th>
<th>Proposed Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>N 4.1: Students compare and order whole numbers and common and decimal fractions of any size, make connections between key percentages and fractions, and describe how a range of factors influence financial decisions. M 4.1: Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.</td>
<td>Through the design proposal students are required to estimate cost of materials, production and recommended retail prices for their merchandise items. Through the design process students will be drawing sketches to scale and constructing their product to scale. This will involve taking correct measurements.</td>
</tr>
<tr>
<td>English</td>
<td>Speaking and Listening OP 4.1: Writing and Shaping OP 4.3:</td>
<td>Through the oral presentation in the ideation phase the students will be assessed against criteria for their speaking skills and observations will be made of their listening skills. The work that the students present in their design diaries and design proposals will be assessed against a criteria sheet.</td>
</tr>
<tr>
<td>The Arts</td>
<td>VA 4.2: Students make and display images and objects, considering purposes and audiences.</td>
<td>Students draw sketches of their proposed piece of merchandise.</td>
</tr>
</tbody>
</table>

Assessment Ideas:
<table>
<thead>
<tr>
<th>Technique</th>
<th>Instrument</th>
<th>Outcome</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Anecdotal notes. Observation notes.</td>
<td>TP 4.1</td>
<td>Teacher uses checklists to assess learning outcomes that have been demonstrated by students as well as</td>
</tr>
</tbody>
</table>

Green Day Tour Merchandise - Lauren Mitchell, Bree Sloss and Sara Thornton
Anticipated evidence statements or criteria sheets.  
TP 4.4  
MAT 4.1  
Students that have not yet achieved the desired outcomes. The teacher will also observe students interactions within groups and listening during oral presentations.

Criteria/Rubric sheets  
Design Diaries.  
Design Proposals.  
Final Product – Merchandise piece.  
TP 4.2  
MAT 4.2  
INF 4.1  
Students are marked both individually and in groups according to criteria sheets for their design diaries, design proposals and the final piece of merchandise that they have constructed.

Peer Assessment  
PMI charts.  
Discussions around the students’ thoughts behind the PMI charts.  
Design diaries – any problems with peers within the group and job allocations  
TP 4.4  
During both the ideation and evaluation phase’s students will give peer feedback, including positives, minuses and what they found interesting about their own piece of merchandise and also other groups.

Context:  
Home and Family: Students will gather and discuss ideas for their design challenge with other people within the home and family environment.  
Personal: Students will develop communication and mediation skills for use within the group and with other peers.  
School: Prepare students for real life situations through the processes involved in the design challenge.  
Community: Interactions with people within the community about their needs and wants.  
Business and Industry: Manufacturing and production design.

Appropriateness:  
Functional: The students’ merchandise should be as functional as possible within the budget and area constraints.  
Aesthetic: The piece of merchandise should be appealing to a wide age range of Green Day fans and should include features that fans need such as I-Pod pocket, Bluetooth, speakers or headphones and much more.  
Social: Students will work collaboratively and improve interpersonal skills, teamwork and communication skills.  
Ethical: The design challenge should provide each student with the opportunity to have their say about what the piece of merchandise should look like and the features it encompasses within a supportive school environment.  
Environmental: Recyclable materials should be used where possible to minimize cost and adverse effects on the environment.

Resources: The materials, tools and equipment used are infinite and are only limited to the students’ creativity. For this particular design the following resources were used:  
Purchased: Calico Material $6.00, Craft glue $2.00, ‘Green Day’ Sticker $1.00, Zip $0.50.  
Materials readily accessible from the household: Cotton, paint, pins, baking paper, pencil, rubber, ruler and scissors, sewing machine.

Management:  
Managing people: Groups of 3-4 students with mixed abilities, gender and friendship groups. Group members are to allocate jobs so that there is an even workload distributed amongst all members of the group. Students are required to document in their design diaries their contribution to the group as an individual and also the progress of the group as a whole.  
Managing resources: Some resources will be provided within the school. Students are also encouraged to source materials from the home such as recyclable materials. Waste is to be kept to a minimum, although it is expected that there will be some wastage during the process in order for the students to improve their design to present an exceptional final piece. Students will work within an allocated area that allows for safe and efficient practices.  
Managing Opportunities: All students are given access to resources such as people, materials and time and each group is given every possibility of success.  
Managing constraints: Students need to complete their design challenge within the allocated time frame and within the budget and area constraints given. Within their groups they do this through planning in their design diaries and design proposals where things will be documented such as job allocations and brainstorming sketches. Students need to negotiate with the teacher and other students and groups the allocation of both time with resources such as special cutting implements and other resources such as cardboard, scissors.
Design Challenge: Moving Rainforest Gallery Walk

Calling all grade seven students... the Gold Coast City Council wants you. As part of a new tourism initiative they are asking grade seven students to design an eco-friendly, moving gallery walk to transport people from the bottom of Mount Tamborine to the top. Students will need to produce a model of their design within the parameters of 450mm by 450mm by 300mm, with a budget of $10, using recyclable products. The model will need to have at least one moving part and cater for able and disabled bodies.

Outcomes, Levels and Strands:
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.  
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.  
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.  
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.  
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.  
SYS 4.1 Students identify and explain the logic of systems and subsystems.  
SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems.

Activities:
Investigation: As students investigate, they need to examine the following:
Students identify various structures, styles, mechanisms and ideas for moving walkways using the internet, magazines, human resources and books. What is their purpose and how do they vary from each other? Students list the positive and negative features under the headings of minimal environmental impact, cost effectiveness of resources, appropriateness and maximum tourism potential. Students record their research data in a journal.

Students attend an excursion to Mount Tamborine to gather information on the environmental landscape, possible positioning of the walkway and the route it will follow.

Students will identify local products and materials that could be used in the building of the design.

Ideate: Students will become part of a collaborative team to combine their information and research to generate design ideas. From these combined ideas, the most appropriate design is created. This design is illustrated by 2D designs of the walkway and its mechanisms. Students must also map the position and route of the walkway showing the terrain. They are to develop a construction plan that shows sequenced steps for the completion of the model, with relevant safety procedures. These components are to be placed in a group portfolio to be submitted with the model for assessment. Students start to gather materials for use in commencing the production.

Production: Students will develop a time management and job allocation plan for the construction, keeping a log book of their individual contribution to be submitted for assessment. Storage and construction sites are identified. Students construct their model, recording any modifications and trials made in their portfolio.

Evaluation: Students present their finished model to the class highlighting their reasons for use of materials and systems. Any modifications and difficulties that the students encountered are also discussed. Students justify the selection and appropriateness of their design. The class discusses all of the designs presented and individually choose the model they feel best meets the requirements of the GCCC, justifying their decision.

Cross-curricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level and Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>N 4.2</td>
<td>Budgeting</td>
</tr>
<tr>
<td></td>
<td>M 4.1</td>
<td>Measurement of walkway, distances and scales/ratios</td>
</tr>
<tr>
<td></td>
<td>M 4.2</td>
<td>Spatial Elements</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timetable</td>
</tr>
<tr>
<td>English</td>
<td>CU4.1</td>
<td>Oral presentation</td>
</tr>
<tr>
<td></td>
<td>OP 4.1</td>
<td>Portfolio</td>
</tr>
<tr>
<td></td>
<td>OP 4.3</td>
<td>Time and Job allocation plan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Individual log book</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Step of Construction (Flow chart)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PMI charts</td>
</tr>
<tr>
<td>SOSE</td>
<td>PS 4.2</td>
<td>Students evaluate moving walkways that are currently present in the world in relation to their impact on the environments.</td>
</tr>
<tr>
<td>The Arts</td>
<td>VA 4.2</td>
<td>2D drawings of the walkways and its mechanisms</td>
</tr>
<tr>
<td>HPE</td>
<td>EPD 4.4</td>
<td>Work in Groups</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Allocation of jobs</td>
</tr>
<tr>
<td>Science</td>
<td>Science and Society 4.2 4.1</td>
<td>Test out the elements of their design</td>
</tr>
</tbody>
</table>

Assessment Ideas:

<table>
<thead>
<tr>
<th>Core Learning Outcomes</th>
<th>Sources of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP 4.1</td>
<td>Journal of research information, anecdotal notes, informal questioning</td>
</tr>
<tr>
<td>TP 4.2</td>
<td>Construction plan (including safety guidelines), portfolio (formative and summarise assessment of design from a rubric), anecdotal notes of collaborative learning</td>
</tr>
<tr>
<td>TP 4.3</td>
<td>Peer assessment of group cohesiveness/participation, log book, time management and job allocation plan (Checklist)</td>
</tr>
<tr>
<td>TP 4.4</td>
<td>Self assessment and peer assessment from focused analysis of questions and responses throughout the interactive presentation, checklist through presentation, rubric for presentation requirements (ie: content, time, distribution, presentation), portfolio (rubric addressing requirements of the design)</td>
</tr>
</tbody>
</table>
Context:
Global/industry: Students should understand the relationship between tourism and the economy, with regards to the use of technology to enhance environmental destinations.
Industry: Students consider health, safety and production requirements when producing and manufacturing models.
School: Students learn to work collaboratively in groups with peers.
Leisure and Recreation: Students recognise the relationships between leisure and recreation, tourism and the environment and the impact they have on one and other.

Appropriateness:
Aesthetic: Does the design complement the natural environment? Is the design aesthetically appealing to tourists?
Functional: Will the design realistically function? Are all systems able to operate? Does the design cater for the able and disabled bodies?
Environmental: Does the design have low impact on the environment? Does it use environmentally friendly materials and power?
Economic: Is the design cost effective? Is the ongoing maintenance time and cost effective?
Social: Does the design cater for the different groups within society?

Resources: The only item that was purchased was the gap filler @ $10.00. Everything else was recycled
Styrofoam  Spray paint (green, brown)  Material
Coloured paper  Liquid nails  Matchsticks
Cardboard box  Cardboard  Sewing machine
Feathers  Craft glue  Wire
Wooden (from off cuts)  Paper towel rolls  Dowel (small and large)
Gap filler ($10)  Material  Masking tape
Hammer  Saw  Carving knife
Sandpaper  Stanley knife  Rulers
Pencils  Pipe cleaners  Fly screen

Management:
Managing people - Students will work collaboratively in groups of 3-4. Students will work in allocated group and individual situations. This will be managed by job allocation plans and individual log books.
Managing resources - The classroom will supply a number of resources, however, any additional resources will need to be brought from outside of the school. Materials and models are stored within the classroom.
Managing opportunities – students are given equal opportunity to be flexible and innovative in their design.
Managing constraints – Students are given 10 weeks to complete the design. They will need to observe budget and time constraints.
Design Challenge: The Classroom of the Future

Your mission if you choose to accept it is to create a classroom of the future. Using recycled materials, design and develop a classroom that students would like to be taught from in the future. They are encouraged to work collaboratively to share ideas, plan the layout and design, and be as creative as possible.

Outcomes, Levels and Strands: Level 3

TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:

Students are given resources such as magazines, books and the internet and asked to research what makes up a classroom. During this time they are to identify features of classroom such as seating, technology, space and color. Then they proceed to create surveys of what their fellow peers expect to see in future classrooms (or what they would like in the classroom). Students are put into groups and discuss ideas and resources between themselves. In their groups they are asked to construct their idea of the classroom of the future, incorporating their ideas and creativity into it. Each group then presents a 5-10 minute presentation about their classroom discussing and identifying the strengths and weaknesses of the challenge, the budget, resources used and how they gained their ideas. The student audience is encouraged to ask questions after the presentation is over. Once all groups have presented they then proceed to participate in a gallery walk and each student is given a piece of paper to vote on which classroom they enjoyed viewing.

Crosscurricular Learning:

SOSE- TCC 3.3 Students use knowledge of people’s contributions in Australia’s past to cooperatively develop visions of preferred futures.

The Arts –
VA 3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings.

Mathematics-
N 3.1 Students compare, order and represent whole numbers to 9 999 and common and decimal fractions, calculate cash transactions and describe other methods of payment.
M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.

Science-
LL 3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.

Assessment Ideas:

The teacher can assess the students work through their design project folio. This will include evidence of the group’s work which may be a photo of their work or their criteria sheet, drawings of their plan and final product, all notes, lists and information which they researched and used and any samples of the resources used. Teachers may also use a criteria checklist throughout the groups presentation and anecdotal notes during the lessons used to create the product.

Context:

This design challenge is associated with the school context.

Appropriateness:

Students should understand the concept of appropriateness and they need to consider the appropriateness of their product, whether it has a positive or negative impact on the environment. This challenge should address aesthetic, economic, environmental and functional appropriateness.

Resources:

All resources used were recycled to keep within budget constraints. These materials were easily accessible and safe for children to use.
• cardboard
• paper
• pipe cleaners
• paddle pop sticks
• toothpicks
• blue tack
• foil
• mini pegs
• patty pans
• colored panels
• stickers
• cellophane

Management:

Managing people
• Students are placed into groups and encouraged to work collaboratively without conflict. If conflict does arise students are encouraged to work through it as a group and if that fails it can then be taken to the supervising teacher for further discussion. A set of rules should be devised as a class, discussion of the safety of the work area and a criteria sheet for the presentation.

Managing resources
• Students are provided with a range of resources but also encouraged to bring their own from home. They should be encouraged to bring materials which are recycled or within a cheap budget of a few dollars. All materials used should be safe, non toxic and easily accessible. Rules should be made which enforce the amount of resources each group is to use and the size and safety of materials. Students should be encouraged to research the materials which are used to create real-life classrooms and upon identifying these decide in their groups materials which can be used which resemble them. They should use a list and a lot of planning to ensure adequate resources are used and shared among the group.

Managing opportunities
• Students are encouraged to use their imagination and creativity throughout the planning and building process. They should be encouraged to sit as a group and discuss the different roles which each student in the group will pursue. Resources such as magazines and websites should be accessible to enable students to investigate designs of classrooms.

Managing constraints
• Students should be aware of the time period they are set to finish the task. One lesson should be specifically set aside for planning and investigating and the other for designing. Students should understand that this task is to be completed in classroom only not in their outside time to enable it to be fair. They should be aware of the constraints of the budget. It should be set within a ten dollar budget between the groups, try as the teacher to encourage the students to use recycled materials. They should also be provided with a criteria sheet identifying what should be addressed in the presentation.
Quick Glove - Melissa Brotchie

Design Challenge: Quick Glove
As the creative development department of Queensland Health, you have been requested to design a means, by which, surgeons and other medical staff, working in hospitals and medical facilities, can be fitted with surgical gloves quicker and more efficiently than the standard means used to date.

Outcomes, Levels and Strands:
Technology Practice - Level 4
TP4.1 – Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 – Students generate ideas through consultation and communicate these in detailed design proposals.
TP4.3 – Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP4.4 – Students gather feedback to gauge how effectively their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Materials – Level 4
MAT4.1 – Students explain how characteristics of materials affect ways they can be manipulated.
MAT4.2 – Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Information – Level 4
INF4.1 – Students analyse sources and forms of information and match these to the requirements of design challenges.

Activities:
Investigation
• Research is undertaken to gather the necessary knowledge, ideas and data to meet the design challenge.
• Students will start their reflective journals/design logs which will require a minimum of one entry per week. Entries should outline ideas, challenges, setbacks, positive and negative experiences and learnings achieved from the design challenge.

Idiation
• Students reflect on the visit to the classroom, of the nurse from the local hospital. Groups will share ideas using a mind map and decide on a model to construct. Students will design a 2D sketch of the design showing dimensions.

Production
• Students will work collaboratively to construct a 3D model of their devise, using as much recycled material as possible.

Evaluation
• Students will self evaluate using the negotiated criteria and ensure those criteria are met. Students will present their model to the teacher and class during a PowerPoint presentation.

Context:
Personal – During this task, students will come to understand that technology affects everyone personally. Students will consider their interests as well as that of others, when developing the 'quick glove' devise.
Global – Students investigate strategies for marketing their design nationally and internationally, whilst considering cultural and economic requirements.
Communities – Students design a solution for fitting gloves to staff at medical facilities throughout their community.
Industry – While undertaking this challenge, students consider the importance of functional design and work place safety in a medical facility.
School – Students recognise the benefits of working collaboratively with other students and teachers (teamwork).

Appropriateness:
Aesthetic – Students should consider visual pollution and design the model to appeal to the medical situation, for which it is designed.
Economic – Students need to consider the cost of materials and work within the budget, agreed to by the class.
Environmental – This task promotes the use of recycled materials to produce a model and to minimise the use of new materials.
Functional – Model should be made in proportion to the surgical gloves provided by the teacher.
Social – This task promotes the development of social skills, whilst students work collaboratively to research, design and construct their design solution.
Cultural – The design proposed must recognise the needs and requirements of different cultures.

Resources:
• Use of existing classroom.
• Research materials, books, videos, posters, brochures and internet websites.
• Students will be encouraged to utilise recyclable products from within the classroom, industry or home- e.g. wood, cardboard, paper, wire, plastic and containers etc.
• Pencils, paper, rulers and erasers for drawing plans.
• Glue, string, sticky tape and paint.
• Construction tools-scissors, stanley knife, glue guns, sandpaper and brushes.
• Safety equipment to be supplied by teacher- eye protection and dust masks.
### Crosscurricular Learning:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcome and Level</th>
<th>Proposed Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Arts</td>
<td>VA4.2 Students make and display images and objects, considering purposes and audiences.</td>
<td>• Students will make and display advertising posters of their products including catch phrases.</td>
</tr>
</tbody>
</table>
| Mathematics | M4.2 Students identify and solve addition and subtraction problems involving whole numbers and common and decimal fractions.  
M4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes.  
S3.2 Students interpret and create maps and plans using a range of conventions. | • Calculate costs to manufacture item for sale.  
• Draw a 2D sketch of the design.  
• Produce a 3D model of the design from the design sketch. |
| English     | CR4.3 Students choose aspects of subject matter, attributes, processes and visual resources, to construct representations of people, places, events and things in ways that appeal to certain groups.  
CR4.1 Students identify how the selection of subject matter, and the participants, processes, gestures and voice qualities used to construct representations, is influenced by likely characteristics of the listener. | • Writing reflections in a journal/design log.  
• Oral presentation.  
• Report of the findings from research as to improvements which could be made to the working conditions/technology of the emergency room at the local hospital. |
| SOSE        | SPR4.2 Students plan and manage an enterprise that assists a community or international aid project.  
TCC 4.4 Students critique information sources to show the positive and negative effects of a change on different groups. | • Visit to classroom of an A & E nurse from the local hospital to talk about his/her working environment and the career of nursing and to answer questions.  
• Students work in groups of three to design a new, more efficient A & E ward for the local hospital. |
| HPE         | EPD 4.4 Students demonstrate skills and actions that support the rights and feelings of others. | • Students work together as a team, communicating cooperatively to make decisions concerning all aspects of the design challenge. |
| Science     | Energy and Change  
ECD 4.2 Students collect and present information about the transfer and transformation of energy. | • Students design a motor for their 'Quick Glove' design and present detailed design sketches to the class. |

#### Assessment Ideas:

<table>
<thead>
<tr>
<th>Techniques</th>
<th>Evidence</th>
<th>Instrument</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher observation</td>
<td>Working practices, collaboration &amp; communication skills - areas needing more assistance.</td>
<td>Anecdotal records, checklists and reflective journals/log.</td>
<td>Work in progress</td>
</tr>
<tr>
<td>Student/teacher consultation</td>
<td>Depth and nature of understanding and participation.</td>
<td>Anecdotal records, checklists, question sheets &amp; student/teacher discussion.</td>
<td>Formal &amp; informal discussion/questioning.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Application of knowledge, communication skills, problem solving, decision making and use of terminology.</td>
<td>Concept maps, annotated drawings, group discussion/debate, written tasks-plans, planning, design log, explanation, creative writing, note making.</td>
<td>Class presentations/performance.</td>
</tr>
<tr>
<td>Self/peer assessment</td>
<td>Areas of concern and strengths.</td>
<td>Checklists, criteria sheets, reflective journal/design log.</td>
<td>Self reflection noting concerns and critique of peers.</td>
</tr>
</tbody>
</table>

#### Management:

**Managing people**
- Students will work collaboratively in small groups (3) to design a ‘quick glove’.
- Groups will negotiate and assign jobs to each member (e.g. scribe, manager, communicator).
- Students need to help create and be able to work in, a supportive learning environment.

**Managing resources**
- Classroom arranged for group work (workstations).
- Correct use of equipment at all times with appropriate supervision and thought for other people.
- Students may access all classroom resources and use items their group has supplied for the activity.

**Managing opportunities**
- All students spend equal time with and have access to, classroom/school resources and teacher support.
- Special needs students are also able to access teacher aide assistance.
- Parents and carers could be invited to an exhibition evening to allow students to showcase their designs and discuss student progress.
- Digital photos of the design solutions could be placed on the class website with a short description of the product’s features.

**Managing constraints**
- Students to agree on constraints of size and cost of manufacturing their product prototype.
- Students will work within the time allocated to complete the task.

**Risk management**
- Students will be reminded of safety issues when using cutting devices, adhesives and safe storage and movement of these items.
Flood Plain Challenge - Nathan Tait, Donna Cotugno and Lara Tideswell

Design Challenge: Flood Plain Challenge
Students are to design and construct an estate area, either residential or industrial, that would utilise the vast flood plain regions that are found around the Gold Coast region. Students show both the before and after effects of their design. The materials to be used are to be recyclable materials.

Outcomes and Strands
Level 4 - Year 7

TECHNOLOGY PRACTICE
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

INFORMATION
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.

SYSTEMS
SYS 4.1 Students identify and explain the logic of systems and subsystems.

MATERIALS
MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Context
Home and Family, Communities, Personal and Local

Constraints –

Activity
Investigation - Students research natural disasters on a global scale and the effects such disasters can have on the environment, as well as human living conditions. Students also investigate and research local weather patterns, as well as recorded floods and flood levels in their community. Students are also required to research the geographical landscape of the local region. Students engage in exploring various designs of flood prevention.

Ideation - Students begin to collect information and research designs that will meet the guidelines of the design brief. Students will brainstorm on possible solutions and decide on a final idea. They will begin to collect their materials and look at the many ways in which a flood plain can be utilized in an effective and sustainable way. Students begin to accumulate their materials (preferably recyclable) whilst remaining within the $10 budget, and measurements of 450mm x 450mm x 300mm. Students will confer and brainstorm on the possible solutions of the design as well as the systems that will be put in place in order for the design to work effectively.

Production - Students begin to formalize their design plan and materials for construction. Students will list a set of procedures to follow for the construction of their flood plain redevelopment. Before construction begins, students will perform a risk management chart on the materials, tools and work environment for which the construction will take place. Construction begins following the set of procedures that the students outlined, all the whilst students will continue to work collaboratively while reassessing the design process. Students will implement their design processes and system into the flood plain redevelopment project.

Evaluation - This is an ongoing process whereby all students within the group have provided feedback and judgements on the appropriateness of their design. The students will present their design model to their peers. This presentation will cover their summary of the design process, the materials they used, their planning and construction challenges throughout the process.

Resources
There are a myriad number of resources that could be utilised for this design challenge. As a group we were able to narrow them down to a select but vital few. Keeping within the $10 budget constraint the following resources were purchased: Paddle pop sticks, craft glue, coloured cardboard and masking tape. The other materials used were found, collected and or donated to the design process: paint, chicken wire, coolite boxes, coconut, food dye, newspaper, flour, water, water bottles, plastic container, Lego and straws.

Management
Resources - All groups will be given equal access to all tools supplied within the time given during class. A specified room will be given to store all designs and materials at school.

Management:

People – Students will develop an understanding of group/team dynamics as well as roles and responsibilities of individuals within the group. Students will implement their own set of democratic rules for their team, ensuring that each member contributes to and provides an equal share of input, knowledge and information. Students and teachers will emphasise the importance of safe practices during the planning and constructing of their design challenge.

Opportunities – Students will be continually encouraged to be creative, innovative, practical, well planned and resourceful within the design challenge whilst trying to refer their design challenge to a local context. The design challenges will be presented to their peers through a technology in education celebration.

Constraints – Students will be given an entire term to the prepare, research, construct, present and evaluate their design challenge. Time will be set aside for students to work on the challenge at school. All designs will remain at school where the
construction will take place only. No challenges will be constructed at home. Students will hand in a design challenge folio at the time of the presentation which will begin in week nine. Groups will adhere to the design challenge rules and guidelines and the $10 budget.

**Assessment Ideas**

**Observation** - Observation of group dynamics, cooperation, participation of individuals in regards to design challenge

**Consultation** - Students will keep a ‘Working Journal’ that covers the group meetings, research, plans, group participation, progress of designs and construction and reflections of the individual.

**Formative** – Students will present an Oral presentation on PowerPoint that outlines the design process, the constraints faced, outcomes and objectives of the design and the steps taken to reach the final design product.

**Self and Peer Assessment** – Students will peer assess each others design and presentations using a specific criteria that is developed by the students at the beginning of the design challenge. Students will self-assess their individual contribution to the groups design process through a series of weekly reflections that will be written in the students ‘Working Journal’.

**Crosscurricular Activities**

<table>
<thead>
<tr>
<th>KLA</th>
<th>ACTIVITY</th>
<th>OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Oral Presentations, Daily design journals, Steps of construction - Procedures and Written reflection</td>
<td>Speaking and Listening – Cultural&lt;br&gt;Cu 4.1 When speaking, students:&lt;br&gt;select a suitable text type according to purpose in prepared and spontaneous texts&lt;br&gt;1. choose subject matter and medium that takes account of whether listeners are known or unknown&lt;br&gt;2. develop a main idea or point of view providing some supporting details and evidence to explore ideas and issues offer opinions and attempt&lt;br&gt;Writing and Shaping - Operational&lt;br&gt;Op 4.3 When writing and shaping, students:&lt;br&gt;3. organise and link ideas using generic structure, paragraphs, topic sentences and theme position&lt;br&gt;4. use evaluative verbs and attributes and simple figurative language when developing plot and characterisation and description</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Budget constraints, Money handling, Measurements of design Spatial elements, Space - Location, direction and movement</td>
<td>Measurement 4.1-Length, Mass, area and volume Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.</td>
</tr>
<tr>
<td>SOSE</td>
<td>Environmental issues, Recycle Sustainability, Cooperative group work and decision-making.</td>
<td>Place and Space – PS 4.1 Students make justifiable links between ecological and economic factors and the production and consumption of a familiar resource. Systems, Resources and Power - SRP 4.2 Students plan and manage an enterprise that assists a community or international aid project. SRP 4.3 Students enact democratic processes in familiar settings using knowledge of representative government.</td>
</tr>
<tr>
<td>The Arts</td>
<td>Construct and decorate model to be an aesthetically pleasing construction.</td>
<td>Visual Arts-&lt;br&gt;VA 4.1 Students deconstruct and reconstruct images and objects to manipulate meaning through explorations of elements and additional concepts. VA 4.2 Students make and display images and objects, considering purposes and audiences.</td>
</tr>
</tbody>
</table>
It’s Time To Party In The Palace!  Nicola Hewitt-Stubbs and Elizabeth Fraser

Design Challenge: It’s Time to Party in the Palace!
It’s Prince Cinders Birthday and he has invited you to attend his Birthday palace disco. However you have nothing to wear and the party is next week. Design a costume, using a maximum amount of $10 that is appropriate for you or your partner to wear to the palace disco. Be prepared to present this costume.

Outcomes, Levels and Strands:

Technology Practice
TP 2.1 Students organise knowledge, ideas and data about how needs and wants might be met and use this information when meeting design challenges.
TP 2.2 Students generate design ideas, acknowledge the design ideas of others and communicate their design ideas using annotated drawings that identify basic design features.
TP 2.3 Students identify sequence and follow production procedures to make products of their own design.
TP 2.4 Students consider initial design ideas with final products and give reasons for similarities and differences.

Materials
MAT 2.1 Students match the characteristics of materials to design requirements.
MAT 2.2 Students select and use suitable equipment and techniques for manipulating and processing materials.

Activities:
Investigations carried out to gather knowledge, ideas and data for use of meeting design challenges:

<table>
<thead>
<tr>
<th>Investigating</th>
<th>Ideating</th>
<th>Producing</th>
<th>Evaluating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students read the story of ‘Princess Cinders’ by Babette Cole.</td>
<td>Students compile a list of popular costumes and fashionable outfits and use the list to complete a concept map in their project books.</td>
<td>Students engage in questioning the guest speaker.</td>
<td>Students present to the class their designs and discuss the effectiveness of the different materials available to them.</td>
</tr>
<tr>
<td>Students discuss the concept of a Palace disco. (What would you see, hear, feel, smell and touch?) Students then write down their ideas into their project books.</td>
<td>Students decide how their model will be displayed, so they can establish what design they wish to create.</td>
<td>Students use cardboard templates, coat hangers, mannequins, resources made by the students or resources created by the teacher to construct their costume.</td>
<td>Students discuss the effectiveness of the different materials available to them.</td>
</tr>
<tr>
<td>A guest speaker from the Gold Coast Arts Centre costume hire, speaks about and shows students different costumes.</td>
<td>Students record ideas of what they think their costume could look like in their project books.</td>
<td>Students decide how their model will be displayed, so they can establish what design they wish to create.</td>
<td>Students present their costumes to the class in a clear, precise manner.</td>
</tr>
<tr>
<td>Students look at different eras of fashion using the internet, books, magazines and other resources.</td>
<td>Using think pair share, students discuss their designs and the possible materials they will use to create their costume, with a pair, then their table.</td>
<td>Students use cardboard templates, coat hangers, mannequins, resources made by the students or resources created by the teacher to construct their costume.</td>
<td>Students have set out their portfolios properly, labelling where necessary and using appropriate headings.</td>
</tr>
<tr>
<td>Students cut out and paste into their books, fashion they find appealing.</td>
<td>In pairs, students cooperatively design, sketch and label a costume in their project books.</td>
<td>Students have prepared an effective presentation that is well presented to the class.</td>
<td>Students present to the class their design, remarking on what they like, what could have been improved and changes they made.</td>
</tr>
<tr>
<td>Using resources students investigate costume features such as the colour, texture, shape, style and elasticity of materials.</td>
<td>Students produce imaginative designs, that they present in their think pair share situations.</td>
<td>Students have prepared an effective presentation that is well presented to the class.</td>
<td>Students have prepared an effective presentation that is well presented to the class.</td>
</tr>
</tbody>
</table>

Assessment Ideas:
Assessment ideas should provide students with feedback throughout the design process.

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Source of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observations:</td>
<td>Students involve themselves in open discussion with the class, their table and pairs.</td>
</tr>
<tr>
<td></td>
<td>Students engage in questioning the guest speaker.</td>
</tr>
<tr>
<td></td>
<td>Students understand the design challenge requirements and use effective investigation skills to find appropriate information.</td>
</tr>
<tr>
<td></td>
<td>Students work effectively in their pairs.</td>
</tr>
<tr>
<td>Project Book:</td>
<td>Produced a working concept map.</td>
</tr>
<tr>
<td></td>
<td>Evidence of their self research, ideas and designs.</td>
</tr>
<tr>
<td></td>
<td>Evidence of process of costume design individually.</td>
</tr>
<tr>
<td></td>
<td>Evidence of process of costume design and chosen model in pairs.</td>
</tr>
<tr>
<td></td>
<td>Proof of sketch and design with labelling of both.</td>
</tr>
<tr>
<td></td>
<td>Students have commented on good and bad factors and possible changes to be made.</td>
</tr>
<tr>
<td>Criteria Sheet/ Rubric:</td>
<td>Individually:</td>
</tr>
<tr>
<td></td>
<td>Students involve themselves in all forms of discussion.</td>
</tr>
<tr>
<td></td>
<td>Students produce imaginative designs, that they present in their think pair share situations.</td>
</tr>
<tr>
<td></td>
<td>Students have set out their portfolios properly, labelling where necessary and using appropriate headings.</td>
</tr>
<tr>
<td></td>
<td>Students work cooperatively and collaboratively in their pairs.</td>
</tr>
<tr>
<td></td>
<td>Students make sufficient and productive comments about the costumes they produced.</td>
</tr>
<tr>
<td></td>
<td>There is clear evidence of the steps the student took to get to the final result.</td>
</tr>
<tr>
<td></td>
<td>In pairs:</td>
</tr>
<tr>
<td></td>
<td>Students design creative costumes, which are appropriate for a palace disco.</td>
</tr>
<tr>
<td></td>
<td>Students present their costumes to the class in a clear, precise manner.</td>
</tr>
<tr>
<td></td>
<td>Students have cooperatively designed, sketched and labelled their costume diagram in both their books.</td>
</tr>
<tr>
<td></td>
<td>Students have prepared an effective presentation that is well presented to the class.</td>
</tr>
<tr>
<td></td>
<td>Students have used an appropriate model and materials to create their final piece.</td>
</tr>
<tr>
<td>Presentations:</td>
<td>Students refer to their project books to show the process that they took.</td>
</tr>
<tr>
<td></td>
<td>Students suitably comment on the effective/ineffective points about their costume and relay to the class changes they made and why.</td>
</tr>
<tr>
<td></td>
<td>Students appropriately display their piece, so the entire class can see.</td>
</tr>
<tr>
<td></td>
<td>Students keep the class entertained and interested about their presentation.</td>
</tr>
</tbody>
</table>

Context: This design challenge is based around the personal, recreation and leisure contexts, as it involves designing a costume that the students themselves could wear in their spare recreational or leisure time.

Personal: When constructing their costumes, the students were able to identify what they liked and didn’t like about particular costumes/fashion and this allows them to; see what they like to wear and why, to know what fashion matches and be able to choose good quality products.

Leisure: Through designing and creating products and manipulating materials, students gathered information about different types and styles of clothing, how to create these pieces and gave them something to do at home in their spare time.
**Recreation:** During this task, students were able to experience life as a famous musician and wear clothes that resemble a famous celebrity. This activity gave students a chance to look at different eras of fashion and their continual renewal, different costumes that actors wear and what a possible costume could be for them to wear to either a disco or fancy dress party.

**Appropriateness:**

**Functional:** Is the costume a functional piece to be worn at a palace disco? Is it comfortable and easy to move around in?

**Aesthetic:** Would you be comfortable going out in this costume? Do you think that it is visually appealing to others? What could you change to make it more appealing?

**Social:** Does the design cater for only one age bracket or can people of all ages wear this costume? Has the different eras of fashion inspired your design at all or are you working on a basis of what you like now?

**Cultural:** Is this piece culturally considerate or was it created for one particular culture?

**Environmental:** Students are encouraged to use materials that are available to them so as to be environmentally aware and stay within budget.

**Economic:** Have you successfully used resources from around your home and the classroom to create your design? Have you stayed within the $10 budget?

**Resources:**

- A guest speaker from the Gold Coast Arts Centre costume hire outfits and use the list to complete a concept map in their project books.
- In pairs, students cooperatively design, sketch and label a costume in their project books.
- Students present to the class a 2 minute PowerPoint.
- Students record ideas of what they think their costume could look like in their project books.
- Students are encouraged to be innovative, creative, well researched, well planned and thought out design. This design will be presented to the class at the end of week 8, because they will be presenting to the class during the final lesson of that week. There will be approximately 2 lessons per week for students to work on this challenge; this should be sufficient time for all activities to be completed and finalised.

**Crosscurricular Learning:**

<table>
<thead>
<tr>
<th>KLA Activity</th>
<th>Strand, Level and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Arts</strong></td>
<td>The Arts- Visual Arts</td>
</tr>
<tr>
<td>-Designing of the costume.</td>
<td>VA 2.1 Students make images and objects by selecting and manipulating elements and additional concepts.</td>
</tr>
<tr>
<td>-Process in the portfolio.</td>
<td>VA 2.1 Students identify elements and additional concepts to interpret images and objects from a variety of cultural and historical contexts.</td>
</tr>
<tr>
<td>-Creating the costume and model.</td>
<td></td>
</tr>
<tr>
<td>-Students record ideas of what they think their costume could look like in their project books.</td>
<td></td>
</tr>
<tr>
<td>-In pairs, students cooperatively design, sketch and label a costume in their project books.</td>
<td></td>
</tr>
<tr>
<td>-Students create their costumes.</td>
<td></td>
</tr>
<tr>
<td><strong>English</strong></td>
<td>English- Speaking and listening</td>
</tr>
<tr>
<td>-Students listen to the fairy tale 'Prince Cinders' by Babette Cole and then discuss the concept of a Palace disco. (What would they see, hear, feel, smell and touch?)</td>
<td>Cu 2.1- When speaking, students: Construct texts to suit a small range of purposes, communicate with known audiences and interact in familiar school situations.</td>
</tr>
<tr>
<td>-In their pairs students discuss and express their views on their model and then write this in their project books.</td>
<td></td>
</tr>
<tr>
<td>-Students present to the class a 2 minute PowerPoint.</td>
<td></td>
</tr>
<tr>
<td>-A guest speaker from the Gold Coast Arts Centre costume hire comes to speak to students about different costumes.</td>
<td></td>
</tr>
<tr>
<td><strong>Studies of Society and Environment</strong></td>
<td>SOSE- Time, Continuity and Change</td>
</tr>
<tr>
<td>-Discuss the concept of a Palace disco. (What would you see, hear, feel, smell and touch and what era would this be?)</td>
<td>TCC 2.1- Students explain different meanings about an event, artefact, story or symbol from different times.</td>
</tr>
<tr>
<td>-Students use the internet, books and other resources to investigate costumes and fashion from different eras.</td>
<td></td>
</tr>
<tr>
<td>-Students compile a list of popular costumes and fashionable outfits and use the list to complete a concept map in their project books.</td>
<td></td>
</tr>
<tr>
<td><strong>Health and Physical Education</strong></td>
<td>HPE- Enhancing Personal Development</td>
</tr>
<tr>
<td>-In pairs, students cooperatively design, sketch and label a costume in their project books.</td>
<td>EPD 2.4- Students demonstrate verbal and nonverbal skills to express ideas, needs and feelings and to show consideration of others.</td>
</tr>
<tr>
<td>-In their pairs students discuss and express their views on their and others models.</td>
<td></td>
</tr>
</tbody>
</table>

**Materials/ Resources:**

Basic materials will be provided: glue, scissors, needles, thread and string, book, magazines, internet access, sewing machine, guest speaker, etc. Other materials will be gathered from home: material, recycled materials, egg cartons, sequins, rope, ribbon, paddle pop sticks, magazines, toys, books, etc. And from school: milk cartons, drink lids, recycled materials, material, stands, models (a wooden stand with a wooden cross attached), books, magazines, internet, the guest speaker, etc.

**Management:**

- Students work cooperatively and effectively individually, within small groups and finally in pairs. Students employ the think pair share technique which allows all students to have their say and voice their opinions. They are given equal opportunities to contribute within their groups and pairs within each phase of the project. Students adhere to the basic school and class codes of conduct when participating within the task and act in a safe manner according to the procedure given by the teacher before all lessons involving home economics tools.

- **Managing people:** All students are given equal access to tools, materials and resources. There will be scheduled times for construction in lessons, under teacher supervision and the store room will be accessed only under the teacher’s permission.

- **Managing resources:** Students set up a gallery walk to show their designs to their peers, and then they present their designs to the class in a two minute PowerPoint presentation. This presentation will later be presented to the students’ parents in an end of year ‘show off-a-thon’. Through this design challenge, students are encouraged to be innovative, creative, well researched, resourceful and imaginative. These skills will be useful in their future development and life long learners.

- **Managing constraints:** Students must stay in a budget of $10 in total, within the 8 week time period. Students will follow the general stages of the design challenge, however if they are confident and the teacher approves, they may go ahead to the next stage of the challenge. Students must have their outfits and presentation ready at the end of week 8, because they will be presenting to the class during the final lesson of that week. There will be approximately 2 lessons per week for students to work on this challenge; this should be sufficient time for all activities to be completed and finalised.
Fun for Everyone - Paula Musson

Design Challenge: Fun for Everyone
Imagine getting together with your friends and heading down to the park to have some fun, but when you get there you have to sit out to the side and watch everyone else enjoying themselves. That’s what it is like for some children when they can’t access playground equipment.

Your mission is to design a piece of playground equipment that someone in a wheelchair can use. Your design solution needs to be no larger than 45cm x 45cm x 30cm, be within a $10 budget and should contain at least one moving part. For those who want an extra challenge, it would be great if your design can be used by both wheelchair and non-wheelchair users.

Outcomes, Levels and Strands: Level 3
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
INF 3.1 Students describe advantages and disadvantages of different forms and sources of information.
INF 3.2 Students select and choose techniques for demonstrating, modifying and presenting information for different purposes.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
SYS 3.1 Students identify and describe relationships between inputs, processes and outputs.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:

Investigation:
Students examine existing playground equipment in their environment.
Students analyse who is advantaged or disadvantaged by present playground equipment.
Students gather information about safety issues relevant to playground equipment.
Students research using books, internet and library resources to investigate moving parts associated with playground equipment.

Ideation:
Students generate ideas through brainstorming for new equipment and/or ways of adapting existing playground equipment.
Students communicate with peers when they share their ideas and take on board others’ concerns.
Students plan when they consider appropriate materials for the task and safety features of their design.
Students design sketches of their ideas from different views.

Production:
Students create a plan for production taking into consideration previously investigated ideas.
Students develop understandings of moving parts and work to overcome any design problems during production.
Students manage time and resources within the limitations of the project.
Students make their design in accordance with the sequence of their plan.

Evaluation:
Students test their design ensuring moving parts function efficiently.
Students judge their design by reflecting on the original constraints of the design challenge.
Students reflect on the design process through their journal entries at all stages and write a final reflection on the whole process.
Students compare their peers’ designs with a set criteria determined by the class and share thoughts and positive reinforcement.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcomes</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>Energy &amp; Change 3.1: Students collect data and make and test inferences to describe the effects of forces (including magnetic and electrostatic forces) on the motion and shape of objects.</td>
<td>Students will investigate the effects of forces and how they can use these in their design challenge.</td>
</tr>
<tr>
<td>Mathematics</td>
<td>N 3.1 Students compare, order and represent whole numbers to 9 999 and common and decimal fractions, calculate cash transactions and describe other methods of payment. M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
<td>Students work within a budget managing monetary constraints. Students draw scale sketches and use measurement when constructing their design.</td>
</tr>
<tr>
<td>SOSE</td>
<td>CI 3.2 Students identify stereotyping, discrimination or harassment to develop a plan that promotes more peaceful behaviours. CI 3.3 Students describe attitudes, beliefs and behaviours that affect their sense of belonging to a range of groups.</td>
<td>Students explore discrimination in their environment and plan for opportunities to promote a more equitable place to play together. Students describe what makes them feel part of a group.</td>
</tr>
<tr>
<td>The Arts</td>
<td>ME 3.2 Students present media texts to a specified audience using presentation techniques associated with particular media forms. VA3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings.</td>
<td>Students prepare materials to promote their design for production. Students design and make their models using a range of techniques and resources.</td>
</tr>
<tr>
<td>HPE</td>
<td>DC3.4 Students suggest how people and the availability of facilities influence choices relating to</td>
<td>Students investigate facilities available to wheelchair users.</td>
</tr>
</tbody>
</table>

39
Students develop and implement strategies, including codes of behaviour, to promote relationships in various groups and situations.

Students work co-operatively in groups and plan a playground suitable for everyone.

English

Cr 3.1 When speaking, students: use aspects of subject matter and resources to construct positive or negative representations of people, places, events and things to achieve their purposes.

Cu 3.3 When writing and shaping, students: negotiate purposes for writing and shaping select relevant genre and medium research familiar and unfamiliar ideas and information to develop a topic or argument that uses some elaborated ideas with supporting details consider interests of the audience when selecting subject matter.

Students prepare promotional texts to promote their design.

Students keep personal journals, make lists of requirements, undertake critical reading during research, write reports, and take part in oral presentations.

**Assessment ideas:**

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused analysis</td>
<td>Students journals, written reports, sketches, plans, oral presentations, criteria sheets</td>
</tr>
<tr>
<td>Teacher/Student consultation</td>
<td>Formal and informal interviews with students during different phases of the design challenge keeping anecdotal notes</td>
</tr>
<tr>
<td>Observations</td>
<td>Anecdotal notes, checklists, photos</td>
</tr>
<tr>
<td>Self and peer assessment</td>
<td>Criteria sheets</td>
</tr>
</tbody>
</table>

**Context:**
- **Personal:** Students design a piece of playground equipment that they consider to be fun
- **Business:** Students investigate marketing strategies to advertise their design
- **Community:** Students consider community needs and town plans for playgrounds
- **Home and Family:** Students consider the needs of different families
- **Leisure & Recreation:** Students investigate recreation activities they enjoy

**Appropriateness:**
- **Aesthetic:** Is the design visually pleasing? Does it fit in the surrounding environment?
- **Cultural:** Does it suit the needs of a variety of cultures?
- **Economic:** Have the students stayed within the budget for the project?
- **Environment:** Is the design environmentally friendly? Have recyclable materials been used?
- **Ethical:** Who is advantaged or disadvantaged?
- **Functional:** Is the design functional? Do moving parts work? Does it meet the design criteria? Does it include safety features?
- **Social:** Is it appropriate for a range of people? Does it encourage social interaction? Did the group work together successfully?

**Resources:**
Students are able to use a wide variety of recycled materials as well as tools and supplies from the classroom eg: Cardboard, boxes, polystyrene, bubble wrap, buttons, straws, kebab sticks, paddle pop sticks, twist tie, bamboo stakes, wood, non-slip rubber mat, paint, tape, glue, screw eyes, Stanley knife, pliers, hot glue gun and scissors. Students are encouraged to collect items from home, recycle facilities or the local environment.

**Management:**
- **Managing people:** Students work collaboratively in teams. They take responsibility for themselves and others and consider safety, equipment and workspace.
- **Managing resources:** Students bring in resources from home. They take responsibility to ensure they select appropriate resources and minimise waste. They evaluate their own and others' designs and how the resources selected meet their needs, wants or opportunities.
- **Managing opportunities:** Students are encouraged to use their imaginations and to be creative. They investigate ways to market their design.
- **Managing constraints:** Students are required to work within the constraints of a $10 budget. The design challenge is part of a ten week unit so are required to set goals and work through stages in their design process. Students are also required to consider how their design meets the needs of the challenge.
Design Challenge: The Lunch Companion

Have you ever opened your lunchbox and your sandwich is squashed, your apple is bruised, your popper is leaking and your chips are soggy? Here’s your opportunity to rid your day of these unwanted experiences so they are a thing of the past. Your challenge is to design a lunch companion to hold and protect your packed lunch.

Outcomes, Levels and Strands:

TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:

Investigation
- Students in groups of 6 will create a mind map of the food in their lunch companions. Discussion on healthy food choices in order to have a healthy diet.
- Students will investigate different lunch box containers in a gallery walk. Students will then compare design (compartments, size), durability (materials), suitability, cost and aesthetic appeal.

Ideation
- Students in pairs using information acquired will discuss design features for their lunch companion.
- Students will draw a 2D designs to scale and label its special features. Student will then present it to the class.
- Students will discuss as a class group the different ideas presented in the presentations.
- Students will reassess and modify their designs and draw up a final blueprint on the computer using a program like publisher.
- Students will design an artwork appropriate for a lunch companion.

Production
- Students will (in pairs) cooperatively decide on sequence of steps and a timeline for construction of their lunch companion. A time frame will be given to students for the completion of the design challenge.
- Students will cooperatively decide on materials for their lunch companion with consideration to budget and size.
- Students will create their lunch companions.
- Students will record the challenges and problems that arose during the production process in their journals.

Evaluation
- Students will test the functionality of their lunch companions by transferring their lunches into their lunch companions.
- Students will critically evaluate their lunch companions to ensure that all criteria has been met – durability, suitability, budget constraints and aesthetic appeal.
- Students present their lunch companions to the class, explaining the construction process, challenges and problems and a justification of design choices.
- Students will take part in a gallery walk and will fill in peer evaluation forms.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math</td>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
<td>Drawing Designs to scale, measurement of materials</td>
</tr>
<tr>
<td>The Arts</td>
<td>VA 3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings.</td>
<td>Artwork on lunch companion</td>
</tr>
<tr>
<td>HPE</td>
<td>EDP 3.4 Students demonstrate communication, cooperation and decision-making skills to collaborate in social, team or group situations. PHIC 3.2 Students explain how eating behaviours affect health and take action on a food-related goal which promotes health.</td>
<td>Communicating and co-operating in group situations Discussion on healthy foods</td>
</tr>
<tr>
<td>English</td>
<td>Speaking Op 3.1 use logical sequence when organising ideas speak audibly and with clarity by using projection, articulation and appropriate volume Writing CU 3.3 Negotiate purposes for writing and shaping, select relevant genre and medium. OP 3.3 Organise and link ideas using generic structure, layout, and text connectives, conjunctions and referring words, use commas and apostrophes, use paragraphs for separate meaning, use sound, visual and meaning patterns and knowledge of word functions to spell unfamiliar words.</td>
<td>Presentations Journal writing</td>
</tr>
</tbody>
</table>

Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment techniques</th>
<th>Sources of evidence</th>
<th>Recording instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Observing student interactions, teamwork, discussions,</td>
<td>Checklist</td>
</tr>
<tr>
<td></td>
<td>progress</td>
<td>Anecdotal records</td>
</tr>
<tr>
<td>----------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>Consultation</td>
<td>Whole class discussions, group discussions, teacher student discussions</td>
<td>Checklist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Observation notes</td>
</tr>
<tr>
<td>Focused analysis</td>
<td>Journal entries, design plans, sequence of steps and time line for construction.</td>
<td>Portfolio</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Journal, Criteria Sheet</td>
</tr>
<tr>
<td>Sell and Peer Assessment</td>
<td>Journal and individual evaluations of own work and class work. Peer evaluation forms.</td>
<td>Journal, Peer evaluation forms</td>
</tr>
<tr>
<td>Oral Presentation</td>
<td>Students will present their 2D plans with an explanation of design features. Students will present their finished product with explanation of its features, what resources they used, problems faced during construction and their feelings on the design challenge.</td>
<td>Checklist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Video recording</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Criteria Sheet</td>
</tr>
</tbody>
</table>

**Context:**

**Personal** – Students integrate their own needs and wants into their lunchbox design. Students gain a range of personal skills throughout the design challenge process including social, creative, communicative and self management skills.

**School** – Students develop the skills associated with group work as they work collaboratively to create a design solution and present it to the class.

**Appropriateness:**

**Aesthetic** – Is the design challenge solution aesthetically appealing?

**Functional** – Does the product meet its intended purpose and requirements?

**Economic** – Does the product meet the budget? Would the final product be cost effective?

**Social** – Who is the intended consumer? Does the aesthetic appeal include all genders?

**Resources:**

- Variety of lunchboxes from home.
- Recycled materials - cardboard, newspapers, shoe boxes etc.
- School Materials - Paper, textures, paint, masking tape, scissors, glue etc.

<table>
<thead>
<tr>
<th>Materials</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard</td>
<td>$0.00</td>
</tr>
<tr>
<td>Newspapers</td>
<td>$0.00</td>
</tr>
<tr>
<td>Flour</td>
<td>$0.99</td>
</tr>
<tr>
<td>Water</td>
<td>$0.00</td>
</tr>
<tr>
<td>Foam</td>
<td>$0.80</td>
</tr>
<tr>
<td>Paint</td>
<td>$4.00</td>
</tr>
<tr>
<td>Cling wrap</td>
<td>$1.40</td>
</tr>
<tr>
<td>Sticky tape</td>
<td>$0.40</td>
</tr>
</tbody>
</table>

**Management:**

**Managing people**

Students work together in groups throughout the design challenge. Groups are formed collaboratively between the teacher and students. Teachers and students will collaboratively design a set of health and safety rules for design challenge.

**Managing resources**

Students are asked to bring a variety of resources from home throughout the design challenge (lunch boxes and recycled materials). A variety of stations will be set up around the room with a schedule where students will need to nominate what time slot they would prefer in the time allocated to the project. Set up, use and clean up expectations are clearly displayed in the classroom and discussed with students prior to the commencement of the design challenge.

**Managing opportunities**

Students are asked to be creative and imaginative they are designing a lunch companion, not just a lunchbox.

**Managing constraints**

This is a 5 week unit with 90min per week of allocated time. Students have a budget of $10 to adhere to. Students need to take into consideration their lunch companion is not just for themselves but a possible product for all.
Energy Saver School - Jan Laws and Renee Coventry

Design Challenge: Energy Saver School
The Queensland Government have announced a new school is being built in the North-Western Gold Coast region to meet the growing needs of the community. The government is setting a challenge to all the schools on the Gold Coast to design a school that uses alternate ways to obtain and use energy. The dimensions of the model cannot exceed 450mm x 450mm x 300mm and the cost to build the model must be no greater than $10.

Outcomes, Levels and Strands:
TP3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP3.4 Students test and judge how effectively their own or others’ processes and products meet the design challenge.
INF3.1 Students describe advantages and disadvantages of different sources and forms of information.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine accurately in order to meet design requirements.
SYS3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:
Throughout the four activities Bloom’s taxonomy will be used to guide the learning tasks and activities. An inquiry approach will also be used to enhance the skills of critical analysis, questioning, problem solving, reflection and decision making.

Investigation
• Students will research and investigate in small groups’ alternate ways to obtain and use energy by brainstorming and using a mind map to bring together possible alternatives.
• Students will examine new concepts and designs for school buildings through the internet and text books.
• Students use a variety of resources to assist investigation of varying designs e.g. library, www, council, and professionals.

Ideation
• Students discuss the pros and cons of using alternate energy using a PMI chart.
• Students will address possible problems and identify solutions by using a concept map as a graphic organizer.
• Students will create a plan of their design.
• Students will settle on the appropriate materials to be used for the model.

Production
• Students will gather, organize and test materials.
• A timeline for the production stages of design will be set in place.
• Students will construct the design within the allocated criteria.

Evaluation
• Before submission of the design to the government students will do a 5 minute presentation to their class to receive constructive feedback from peers and teacher and re-evaluate their final design before final submission.
• Students will keep a portfolio of their design from start to finish as a means of reflection and evaluation.

Crosscurricular Learnings:
Science
SS3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects.
EC3.3 Students identify different ways of obtaining energy.

Health and physical education
NPM3.4 Students demonstrate communication, cooperation and decision-making skills to collaborate in social, team or group situations.

Studies of society and the environment
PS3.2 Students create and undertake plans that aim to influence decisions about an element of a place.
TCC3.3 Students use knowledge of people's contributions in Australia’s past to cooperatively develop visions of preferred futures.

Maths
M3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.

English
Cr3.2 When reading and viewing, students:
• suggest why aspects of subject matter may have been included or omitted to represent people, places, events and things positively or negatively.
Op3.2 When reading and viewing, students:
• make meaning of resources that develop subject matter, signal relationships and organise and link ideas in written and multimodal texts.
Cu3.3 When writing and shaping, students:
• research familiar and unfamiliar ideas and information to develop a topic or argument that uses some elaborated ideas with supporting details.

Assessment Ideas:
• Portfolio – Evidence of research, stages of construction and design model.
• Peer assessment – Presentations.
• Teacher observations – check list.
• Self-assessment – reflective journal.
Context:
School - The challenge is specifically designed for the school context and the alternate ways to obtain energy will contribute to the school environment and assist in having a more cost efficient school.
Leisure & recreation - Energy saving devices can be utilized in parks and sporting facilities.
Agriculture - Can be energy and cost saving solution for the running of machinery.
Global - Using alternate energies will enable the world's resources to be more sustainable for the future and cut the effect of greenhouse omissions.
Home & family - Can be used to run the household energy supplies and reduce the household budget.
Community - Will provide a better future for our children by providing a more sustainable future.
Industry / business - Will contribute to reducing pollution levels and in the long run be more cost effective.

Appropriateness:
Aesthetic - The design should use features that complement the existing surroundings and be visually appealing.
Cultural - The design will consider the community needs and diverse cultural ways of life.
Economic - The design will enable an energy sustainable school which is economically viable.
Environmental - The design will focus on having a minimal impact on the surrounding environment and will reflect the benefit of a sustainable environment.
Ethical - All consideration will be taken not to challenge anyone’s beliefs or values within society.
Functional - The design will demonstrate an efficient and effective school.
Social - The design will meet the needs of the community.

Resources:
The school will provide items such as cardboard, paddle pop sticks, pipe cleaners, toothpicks, glue, scissors, paint, paper, clay, play dough and other basic items. It is recommended that students gather household recyclable items to reduce costs. Also any tools used to build the model need to be approved by the teacher for safety regulations. All other items need to be purchased within the $10 allocated budget.

Management:
Managing People – Students will work in small groups which demonstrate cooperation and negotiation skills, and show empathy for other group members.
Managing Resources – The use of materials from home, school, businesses, community and recycled services will be used to aid the restrictions of the $10 budget.
Managing opportunities – Students will be required to work consistently within the set timeline and all members of a group will sign an agreement at the beginning of the project to ensure individual team members commit to group responsibilities. While doing the design challenge students are to develop ideas and strategies as part of a marketing exercise.
Managing constraints - Throughout the challenge time restraints, budgets, resources and ethical obligations need to be considered.
Design Challenge: Save the Sea Life

Living on the Gold Coast, swimming and playing at the beach are part of our everyday lives. The beaches on the Gold Coast have shark nets in place to help protect the public while swimming, surfing, kite surfing and many other water based activities. Although these shark nets are working by keeping shark attacks away from our beaches without nets so that other marine life does not suffer. Design a solution to this problem with a 3D model no larger than 450mm x 450mm x 300mm, with a budget of $10.

Year Level: 5

Outcomes, Levels and Strands:

<table>
<thead>
<tr>
<th>Technology Practice</th>
<th>Information</th>
<th>Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP 3.1</td>
<td>INF 3.1</td>
<td>MAT 3.1</td>
</tr>
<tr>
<td>TP 3.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP 3.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TP 3.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activities:

Investigation
- Students’ examine how shark nets operate and whether they do an appropriate job.
- Research during library and computer lab classes to gather and interpret information about shark nets and any alternatives solutions from a range of sources.
- Students’ explore the dimensions of the design challenge and make a list of materials that may be needed.
- The students’ need to examine any issues regarding their budget and also investigate their own values and morals on shark nets and their purpose by visiting Seaworld ‘Shark Bay’.

Ideation
- Get the students’ to consider the problems with shark nets and other solutions by using a pros and cons activity sheet to be placed in their ‘design folio’.
- Students’ then generate their own ways to keep sharks away from beaches, from using the information gathered in the investigation stage.
- Students’ are placed in groups and select one idea for an alternative to shark nets.
- In groups students’ communicate ideas to make a design proposal.

Production
- Students’ develop a timeframe of construction, with a step by step guide of how to build the model eg. walls first etc.
- Students’ manage and assign group roles, such as leader and time keeper, researcher.
- Students’ start the construction stage and begin to make their 3D solution to shark nets.

Evaluation
- Once the model has been completed students’ reflect and compare by participating in a gallery walk of their own and fellow class groups 3D models.
- Students’ also self-analyse and judge their effort and the model according to a rubric.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcomes</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOSE</td>
<td>PS 3.2</td>
<td>Students sought a better solution to shark nets for the Gold Coast, and take action by presenting a letter or presentation to the local community or council. Students collect surveys around their school and local community about their feelings on shark nets and if they need a better solution.</td>
</tr>
<tr>
<td></td>
<td>PS 3.3</td>
<td>Students cooperatively collect and analyse data obtained through a field study instruments and surveys, to influence the care of a local place.</td>
</tr>
<tr>
<td>HPE</td>
<td>PHIC 3.3</td>
<td>Students’ learn the water safety rules and beach safety, such as swimming between the flags. The also learn about rips and how to get out of one.</td>
</tr>
<tr>
<td>The Arts</td>
<td>VA 3.2</td>
<td>By making their 3D model and then displaying it on a gallery walk, students need to learn how to display it formally.</td>
</tr>
<tr>
<td>Science</td>
<td>NPM 3.3</td>
<td>When students design their 3D models they have to consider what tools may work the best eg. glue, nails, sticky-tape etc.</td>
</tr>
<tr>
<td>English</td>
<td>Cu 3.2</td>
<td>When students are collecting data and information, they need to interpret and find the most likely resources relevant to their 3D model.</td>
</tr>
<tr>
<td>Maths</td>
<td>M 3.1</td>
<td>Students’ plan and draw their model in scale.</td>
</tr>
<tr>
<td></td>
<td>S 3.1</td>
<td>Students’ use 3D shapes in their models for the design challenge and understand their nets so they can make 3D shapes for their own shark enclosure models.</td>
</tr>
</tbody>
</table>
Assessment Ideas:

**Observation**
The teacher can observe ongoing individual work, by students keeping a 'design folio' where they place any work they have done such as sketches, pro/con sheets, information ideas.

**Consultation**
Have students keep log books of their contribution to the 3D model and have the teacher use a checklist at each planning and construction stage.

**Focused Analysis**
Have each group present their 3D model to the class after the gallery walk to describe the model, why it was chosen and the process that was undertaken.

**Peer/Self Assessment**
Using a rubric let the students self assess by having criteria ranging from their individual work and their group work. Also use a comment sheet during the gallery walk where students can peer assess by making a positive statement and a suggestion to make the model better.

Context:

**Business:** Students are aware of the aspect of how well their solution will work, if it is marketable and affordable.

**Global:** From students research, they can see how other countries do or do not use shark nets, and if their solution to this problem could be used around the world.

**Communities:** Students have to design this for Gold Coast beaches so are therefore considered to invest time in researching the local shark nets and the communities’ views on if they should be used.

**Leisure & Recreation:** Students design the alternative to shark nets in relation to the local surfing and beach/water activities that take place in the Gold Coast beaches.

**Industry:** Students will understand that the design challenge focuses on environmental issues and how the solution can help fix some conservation of marine animals.

**Personal:** Students will develop design ideas on their own, then work in a group to build a model, which will help them with interpersonal and decision making challenges.

**School:** The students can gain useful skills in critical analysis when presenting their own models in a gallery walk.

Appropriateness:

**Environmental / Ethical:** Students must consider their environmental impacts of their design. How many marine animals are being affected by the shark nets?

**Cultural:** Will the community back a change to shark nets, considering their have been no attacks since they have been in place?

**Functional:** Is the design a realistic alternative to shark nets? Will it work?

Resources:
Encourage students to use materials from around their house. Visit a recyclable centre to gather resources for the classroom, where students can use freely. They have a budget of $10; therefore can buy certain materials to enhance their models. Using recyclable materials and resources helps the students to develop creativity.

Management:

**Managing people:** Students work in groups to come up with a final design for their model, therefore learning to work cooperatively and in a team. Safety procedures are also in place when working with equipment.

**Managing resources:** All students have equal access to equipment and resources.

**Managing opportunities:** The students will have the opportunity to present to the class and also participate in a gallery walk, where they are encouraged to give positive feedback. This gives the students a chance to ask questions about each groups design.

**Managing constraints:** Students have to have their design finished in the timeframe allocated and within the budget constraints.
Design Challenge: Incentives for Recycling

It’s 2010 ….. “WHERE ARE WE GOING TO PUT IT” screams The Gold Coast Bulletin. “WE ARE RUNNING OUT OF LANDFILL SPACE” says Mayor Julie Smith “And the community is still not recycling effectively!”
The Council need your help! We need incentives to encourage our communities to recycle. Help us find a way to do this.

Outcomes, Levels And Strands

<table>
<thead>
<tr>
<th>TECHNOLOGY PRACTICE</th>
<th>INF3.1 Students describe advantages and disadvantages of different sources and forms of information.</th>
</tr>
</thead>
</table>
| Level 3 – Level Statement | MATERIALS Level 3 – Level statement
Students choose materials that have characteristics most suited to the product and to user needs. They select and use suitable equipment and techniques to combine materials accurately. |
Core learning outcomes

| TP3.1 | Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges. |
| TP3.2 | Students collaboratively generate design ideas and communicate these using presentations, models and technical terms. |
| TP3.3 | Students cooperatively develop and follow production procedures to make products that reflect their design ideas. |
| TP3.4 | Students test and judge how effectively their own and others’ processes and products meet the design challenge. |

| INFORMATION | LEVEL 3 – Level statement
Information originates from different sources, exists in various forms and can be used for different purposes. Information can be manipulated, presented and managed in different ways for different purposes. |

Activities

| Investigating | Ideating
Students engage in reading of media article regarding issues of waste management. In brainstorm activity students critically analyse and discuss implications for the future. Students use the internet to gather information of possible solutions for waste management. Students engage in discussion with visiting industry expert in recycling. |

| Producing | Evaluating
Students construct model meeting stated criteria i.e. budget Student at regular intervals complete their process journals |

Crosscurricular Learnings

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand level outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Students through classroom discussions develop a topic and supporting details and make connections between these.</td>
<td>Cu 3.1 When listening, students recognise that certain types of texts are used for particular purposes and audiences</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Students consider measurement when planning model.</td>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
</tr>
<tr>
<td>SOSE</td>
<td>Students using Think Wink Decide identify common activities which cause environmental problems and devise solutions to those problems.</td>
<td>PS 3.6 Students cooperatively identify an environmental issue of concern and contribute to its resolution.</td>
</tr>
<tr>
<td>The Arts Visual Arts</td>
<td>Students use ‘think aloud strategies’ to discuss what lines, shapes, textures and colours can be seen and used?</td>
<td>VA 3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings</td>
</tr>
</tbody>
</table>
Assessment Ideas:
Observation: Anecdotal record/ Checklists/ Work samples.
Focused analysis: Learning Journal completed weekly/Teachers digital imaging of presentation
Peer & self-assessment: Analysis sheets during forum

Context:
Personal: Working collaboratively promotes students’ understanding of the decisions and processes that are required to achieve technological outcomes.
Communities: Students become more directly involved with the issues that affect their community and benefit by addressing these and attempting to resolve them.

 Appropriateness:
Economic: Product viability is excellent in achieving the overall objective.
Environmental: Major long-term benefits for the environment.
Functional: Product achieves all goals efficiently and effectively.

Resources:
Plywood $3.60
Recycled Wheels 0.20
Wheelie Bin 0.00 (Donated SOLO Resource Recovery)
Lever 0.00 (Household scraps)
Paint 3.50
Stickers/windscreen 1.50
He man 0.00 (kindly donated)

Management:
Managing people
• Students’ work collaboratively and co-operatively in all aspects of the design challenge
• Procedures to ensure safety (risk analysis) in the work area are outlined by the teacher from the onset and agreed to by all students and a clear understanding is established of what taking responsibility for one and for others means.

Managing resources
• Students’ select appropriate materials to complete the product with minimization of waste as their focus.

Managing opportunities
• Students’ identify their ideas use their initiative to plan, manage and organize their challenge whilst working cooperatively towards their goal

Managing constraints
• Students’ are aware of time constraints for completing their project
• Students’ are aware of their budget and must be able to make decisions with regard to the viability of the project if they consider the materials will not meet their budget
• Students will evaluate their end product in terms of meeting the needs and requirements of the challenge.
**A Relaxing, Entertaining and Creative Tuckshop - Sally Ellis and Rebecca Dunn**

**Design Challenge: A Relaxing, Entertaining and Creative Tuckshop**

You have been given a mission to re-design your tuckshop. Your mission is to design a brand new, creative, relaxing and up-to-date eating area which will also entertain the students. In addition to this, you need to design a new tuckshop menu, with particular emphasis on variety and nutritional foods. **Gold Coast School of Design** is sponsoring this competition which is open to all primary school grades. The winning school will be rewarded with an unlimited supply of apples for a whole year! The design constraints are: All materials are to be donated, recycled or from home; maximum size of design model must not exceed 450mmx450mmx300mm. GOOD LUCK!

**Outcomes, Levels & Strands:**

- **TP4.1** Students use consultative methods to gather knowledge, ideas and data when researching alternatives within the design challenge.
- **TP4.3** Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
- **TP4.4** Students gather feedback to gauge how effectively their design ideas and process meet design challenges and how effectively products meet the need of specific users.
- **INF4.2** Students apply techniques for transforming and transmitting information for different audiences.
- **MAT4.1** Students explain how characteristics of materials affect ways they can be manipulated.
- **MAT4.2** Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.
- **SYS4.1** Students identify and explain the logic of systems and sub-systems.
- **SYS4.2** Students incorporate feedback to refine and modify systems and/or sub-systems.

**Activities:**

**Investigation**

Students research existing tuck shops to determine how others have met similar challenges. Students use e-mail/internet to seek information. Students interview students and teachers to generate ideas for a nutritional and varied menu.

**Ideation**

Students draw several sketches of their design with annotations. Students share with each other, their design ideas and discuss possible problems. Students plan and design a nutritional canteen menu. Students develop design proposals to present to a professional draughtsman that include: background information, product purpose and intended users.

**Production**

Students consult a professional draughtsman with practical expertise, to develop skills and techniques for designing their new tuck shop. Students develop a finished group model of the new tuck shop. Students use the Internet/Microsoft Publisher to produce a formal canteen menu. Students record in a logbook, tasks that went wrong/well throughout the production procedure. Students negotiated with each other, time constraints for the production process.

**Evaluation**

Students critically reflect on the model created and evaluate the processes taken throughout the design challenge. Students present their design challenge to the class and discuss the materials used, the structural challenges, the building technique and the special features and benefits of the tuck shop.

**Cross-curricular Learnings:**

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activities</th>
<th>Stand, Level &amp; Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HPE</strong></td>
<td>Students consider what foods their bodies need to stay healthy.</td>
<td><strong>Promoting the Health of Individuals &amp; Communities</strong></td>
</tr>
<tr>
<td></td>
<td>Students create a nutritional menu based on these needs.</td>
<td>4.2 Students develop and implement strategies for optimising personal diet based on identified nutritional needs for growth, energy and health.</td>
</tr>
<tr>
<td></td>
<td>Students survey the nutritional needs of the school community.</td>
<td>4.5 Students identify aspects of their social and physical environment that enhance, or pose threats to their health and plan strategies for achieving healthy environments for themselves and others.</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td>Students present design challenge to the class.</td>
<td><strong>Speaking &amp; Listening</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CU4.1 When speaking, students offer opinions and attempt to persuade others to a point of view.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CR4.1 When speaking, students take into account likely characteristics of target audience and appeal to certain groups by selecting particular subject matter and related resources.</td>
</tr>
<tr>
<td><strong>Maths</strong></td>
<td>Students adhere to size constraints.</td>
<td><strong>Chance &amp; Data</strong></td>
</tr>
<tr>
<td></td>
<td>Students measure the size of the model and attributes within the model.</td>
<td>4.2 Students collect data, record templates, and measure location.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating area, volumes of prisms and lengths of boundaries of rectangles.</td>
</tr>
<tr>
<td><strong>SOSE</strong></td>
<td>Students involve the school community in the planning of a new school tuck shop.</td>
<td><strong>Place &amp; Space</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.2 Students predict the impact changes on the</td>
</tr>
</tbody>
</table>
Students predict and analyse the impacts this construction may have on the surrounding environment by comparing evidence.

**Systems, Resources & Power**

4.2 Students plan and manage an enterprise that assists a community or international aid project.

**The Arts**

Students draft and display their design challenge.

**Visual Arts**

4.2 Students make and display images and objects, considering purposes and audiences.

**Media**

4.2 Students select media forms and apply technologies to construct & present texts to a target audience.

**Science**

Students test and select appropriate materials for use in their design challenge.

**Natural and Processed Materials**

4.3 Students examine and assess ways that materials can be changed to make them more useful.

### Assessment Ideas:

<table>
<thead>
<tr>
<th>Technique</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Portfolio of progression throughout the design challenge.</td>
<td>Students keep all research, sketches, plans and so forth in chronological order in a portfolio.</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>Students critically analyse and reflect the design challenge process focusing on what worked, what did not work and what would be changed next time.</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>Constructive feedback is given to all students from their peers at the end of the design challenge presentation.</td>
</tr>
<tr>
<td>Teacher Observation</td>
<td>Observations of students’ willingness to participate in the design challenge. Anecdotal notes to be kept along the process.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Interview questioning.</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>To ensure all of the design challenge requirements and constraints are met by students.</td>
</tr>
</tbody>
</table>

### Context:

**School** – Students consider the needs of the school when constructing their design challenge. Students think about the practical aspects of their design challenge i.e. the available space, time, monetary factors, the school population and noise pollution.

**Community** – Students consider the needs and wants of the community by carrying out a survey.

**Leisure/Recreation** – Creating a tuck shop which encourages interaction, entertainment and the needs and wants of primary school-aged children.

### Appropriateness:

**Aesthetic** – In building the model, and considering the target audience - Is the design visually appealing? Is the new tuck shop menu appealing? Does it use colour to appeal?

**Social** – The tuck shop encourages social groups and is not gender-biased? Is it a fun and uplifting atmosphere?

**Cultural** – Does the model and menu embrace the cultural diversity of the school?

**Economic** – What are the monetary constraints of the school? Will the school be able to maintain the design costs effectively? Will the school community be able to afford the food prices? Students are to consider to sustainability of a product through the use of recyclable materials.

**Ethical** – Is the design discriminatory towards anyone?

**Functional** – Is the design suitable for the needs of the school? Does the design achieve its desired purpose?

### Resources:

- **Human Resources** = John (Draftsperson) $\text{Cup of Tea}
- **Recycled Resources** = white spray paint, canvas, Styrofoam, sponge, clear pebbles, pens/markers, cardboard rolls, rulers, paper, coloured cardboard. $\0
- **Resources Budget**
  
<table>
<thead>
<tr>
<th>Resource</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardboard</td>
<td>$1.10</td>
</tr>
<tr>
<td>Craft Glue</td>
<td>$2.00</td>
</tr>
<tr>
<td>Pipe Cleaners</td>
<td>$1.50</td>
</tr>
<tr>
<td>Push Pins</td>
<td>$1.50</td>
</tr>
<tr>
<td>Foil</td>
<td>$2.00</td>
</tr>
</tbody>
</table>

### Total $8.10 (not a good choice of material!)

### Management:

- **People**
  - Co-operative and collaborative team work.
  - Minimal interference from parents and teachers during the design challenge.
  - Mixed gender and ability groups

- **Resources**
  - The basic materials needed to complete the challenge are provided such as glue, scissors, paint, etc. Students are encouraged to bring in materials from home to be recycled in their construction to keep costs to a minimum.
  - Students will have access to computers to design and print a menu for the tuck shop.

- **Opportunities**
  - Students have the opportunity to create, to the best of their ability, an up-to-date, entertaining and creative tuck shop.

- **Constraints**
  - Working technology, students are only restricted by Time, model size 450mm x 450mm x 300mm and a budget of $10.
Design Challenge: Light Rail System
Due to the growth of the Gold Coast in recent times and expensive fuel prices. The busy Gold Coast City Council is challenging you to design and develop a new, practical and efficient light rail system. The winning model will be the council’s representative at their next meeting with the state government; however you must follow these guidelines: The light rail system must have an educational element, be within a $10 budget and be no larger than 450mm x 450mm x 300mm. Enjoy your challenge!!

Outcomes, Levels and Strands:
Technology
Technology Practice
TP4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
Materials
M4.1 Students explain how characteristics of materials affect ways they can be manipulated.
M4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.
Information
INF4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.

Activities: (teaching strategies)
Investigation (Examining, analysing, gathering, researching)
- Students use a variety of resources such as the internet and pamphlets to gather information on the current designs of light rail systems. Students also use these resources to generate their own ideas.
- Students gather information through the use of interviews/surveys to gain an understanding of the kinds of features and accessories local people would like to see and use whilst travelling on the light rail system.

Ideation (Generating, communicating, planning, designing)
- Students communicate their ideas with their partner and compromise on which ideas to use.
- Students generate ideas about resources they can use to build their model.
- Students plan their design in terms of tools, equipment and resources needed.
- Students plan their model following the guidelines given.
- Students design their model on paper using diagrams and labels.

Production (Creating, developing, managing, making)
- Students physically create their model by making a system using bought and recycled materials.
- Students manage the resources and tools required.
- Students manage the job of distributing specific jobs between themselves.

Evaluation (Testing, judging, reflecting, comparing)
- Students continually judge the aesthetic appeal, creativity, safety and appropriateness of their plans/model.
- Students compare their ideas/model with the already existing light rail systems.
- Students reflect on whether their ideas/model meets the guidelines given.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level, Outcome</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health &amp; Physical Education</td>
<td>Promoting the Health of Individuals and Communities PH4.3</td>
<td>- Students identify the safety equipment used from a Bob The Builder episode and write down uses for the safety equipment.</td>
</tr>
<tr>
<td>English</td>
<td>Speaking and Listening Cu4.1</td>
<td>- Students identify text to be spoken about and present this along with their model. They provide a conclusion and ensure the audience is engaged.</td>
</tr>
<tr>
<td></td>
<td>When speaking, students:</td>
<td>- Students listen to other speeches about their models and draw meanings from the processes they went through when designing their own model.</td>
</tr>
<tr>
<td></td>
<td>*select a suitable text type according to purpose in prepared and spontaneous texts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*choose subject matter and medium that takes account of whether listeners are known or unknown.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*develop a main idea or point of view providing some supporting details and evidence to explore ideas and issues.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*offer opinions and attempt to persuade others to a point of view.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>When listening, students:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*identify purposes of a range of prepared and spontaneous texts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*identify main issues of a topic and draw conclusions.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*identify meanings not directly stated.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*identify how the roles and relationships between speaker and listener affect the language used.</td>
<td></td>
</tr>
</tbody>
</table>
**Science and Society**

**SS4.3** Students present analysis of the short- and long-term effects of some of the ways in which science is used.

- Scavenger hunt to find materials and discuss which ones would be appropriate for the construction process.

**Mathematics**

**Measurement - Length, mass, area and volume M 4.1** Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.

**Space - Location, direction and movement S 4.2** Students interpret maps and plans with reference to conventions including latitude and longitude for maps, and describe movements using compass points and distance.

- Students go on an excursion to Sea World, to gain an understanding of the size and features of their monorail system.
- Students sketch a plan of their new light rail system using a scale 1cm : 1m

**The Arts**

**Visual Arts VA4.1** Students deconstruct and reconstruct images and objects to manipulate meaning through explorations of elements and additional concepts.

**VA4.2** Students make and display images and objects, considering purposes and audiences.

- Students, from the visual image, use arts material to construct a light rail system.
- Students design their presentation using PowerPoint and appropriate images and visual cues.

**SOSE**

**Time, Continuity and Change TCCD4.7** Students represent ears of past civilisations on a timeline or chart.

- Design a Rights & Responsibilities chart on how to behave appropriately on the new light rail system.

**Assessment Ideas:**

<table>
<thead>
<tr>
<th>Technique/Instruction</th>
<th>Evidence</th>
<th>How</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused Analysis</td>
<td>Oral presentation</td>
<td>Students present their design sample to the class through discussing the processes they went through.</td>
</tr>
<tr>
<td>Observation</td>
<td>Anecdotal records, conflict resolution, participation</td>
<td>Teachers observe students participation throughout their design challenge via anecdotal records.</td>
</tr>
<tr>
<td>Checklist</td>
<td>Completed plans, diagrams, labels</td>
<td>Students show teachers their finished working documents for different aspects of their design.</td>
</tr>
<tr>
<td>Teacher Consultation</td>
<td>Responses</td>
<td>Students respond to teachers on how they went</td>
</tr>
<tr>
<td>Self-Assessment</td>
<td>Responses, technology journal entry</td>
<td>Students write entries into their journals commenting on their progress and a final overall thought.</td>
</tr>
<tr>
<td>Port-folio of work</td>
<td>Collection of ideas, plans and designs</td>
<td>Teachers collect students work as they progress through the design challenge.</td>
</tr>
</tbody>
</table>

**Context:**

- **Personal:** The model is designed to suit personal needs and wants.
- **Business:** The model is designed to appeal to commuters to ensure business is kept.
- **Communities:** The model is designed to meet the needs and wants of the community.
- **Leisure and Recreation:** Students develop awareness for the use of technology in designing and developing a light rail system.
- **School:** Students work collaboratively and cooperatively in pairs.

**Appropriateness:**

- **Functional:** Does the design meet the needs of the social group it is designed for?
- **Aesthetic:** Does the design attract interest due to its aesthetic appeal?
- **Economic:** Has the construction of the model stayed within the budget?
- **Environmental:** Has the model been made using recycled materials?

**Resources:**

- Nikko pen, 2x screws, 6x toilet rolls, 2x scrap wood, colour printed picture, plank of wood, silver and black paint, string, printed paper, silicon, glue, 6x staples, wooden mop handle. (Tools: Handsaw, cordless drill, staple gun, router).
- Budget parameters $10; coloured piece of paper $1.50. **Total Cost $1.50.**

**Management:**

- **Managing people**
  - Students engage in group and personal management in relation to rules, health and safety issues
- **Managing resources**
  - such as information, materials and time
- **Managing opportunities**
  - Students are continually managing opportunities through considering the marketing and presentation of their model.
- **Managing constraints**
  - such as the budget and the guidelines to be met.
Recycled Water - Sarah Taylor and Sarah Dallimore

Design Challenge: Recycled Water

Design and construct a house that can use recycled water or grey water. The water must be not be available for drinking, but the drinking water may be recycled for washing and toilet use. Toilet water must not be drunk. The house must expel all sullage water and only recycle water for washing purposes. The environmental effects must be considered, as well as research into recycled and grey water and how it can be used responsibly.

Outcomes and Strands

Technological Practice

Level: 5 Year: 6 and 7
Strands: Technology Practice, Information, Materials, Systems

TP4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP4.3 Students identify and make use of the expertise of others when following production procedures to make products for specific users.
TP4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the specific needs of users.
TP5.2 Students generate design ideas and communicate these in design proposals that indicate an understanding of factors influencing production of the option(s) they have selected.
TP5.3 Students meet predetermined standards as they follow production procedures to make quality products

Information

INF4.1 Students analyse sources and forms of information and match these to the requirements of the design challenges

Materials

MAT4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their product.

Systems

SYS4.2 Students incorporate feedback to refine and modify systems and or subsystems.

Activities

Watch a film or television documentary on recycling and what it is and why we recycle.
Incorporate the reuse of water into the classroom by introducing a plant or pet into the classroom that requires water. E.g. If you have some water left in your drink bottle that you do not want to drink, water the plant with it.
Have students keep a diary of any water they have reused and what they used it for.
Inform students of the current drought situation that is being experienced.
Have the students do a project or report on droughts and the importance of saving water.

Crosscurricular Learning

Math - Knowledge of L’s and ml’s and measurement
Study of Society and the Environment - Study of recycling and the study of droughts and the effect they have on the ecosystem.
Science - Water and how it is produced initially through rain and precipitation
English - Information report on droughts
Art - Design and creativity is enhanced

The Context

Within this design challenge, the students will be developing concepts which would have an effect on a wide range of contexts: the community, home and family, industry, personal and agriculture.

The community – water restrictions may be lowered
Home and family – the water solutions would have a direct impact on the home structure and the family may need to change their daily routine to incorporate the new technology.
Industry – if the product is marketed on a larger scale there would be a boost in the industry workforce and the production market.
Personal – the implementation of these forms of water solutions would be a personal choice.
Agriculture – these water saving solutions may be sold to agricultural and rural areas in Australia. These solutions may assist these farms in saving their water for crops and farm animals.

Resources

• Gold Coast Water Future Website http://www.gcww.com.au/gcwater/
• other water saving resources including international water saving schemes
• Human Resources – Plumbers, Local Council Members
• Research about grey water and recycled water
• Information from the media about the drought, recycled water and desalinization.

Assessment Ideas

• Design project folio – design blueprints, research information, samples of materials
• Oral Presentation of the Design – students would need to demonstrate the purpose of their design, provide research information and demonstrate the appropriateness of the design. Students would also need to demonstrate the positive and negative effects of the design on society.
• Design Challenge Checklist

 Appropriateness

Aesthetic appropriateness – As the product is installed through the original piping system in the house, the product is virtually invisible. Thus potential buyers should have a positive attitude toward the product’s sensory appeal.
Cultural appropriateness – This product would appeal to home owners and those owning rental properties. As this product helps the environment through saving water, the buyers would have lower water usage rates.
Economic appropriateness – This product would prove to be high cost. Workers would need to be hired to first create the product and then to install it. We predict that this product would only be installed into new houses as it is part of the plumbing and sometimes going underground.
Environmental appropriateness – The development of this product would have a positive effect on the environment. As it was designed to specifically combat the current water restrictions in south east Queensland. Home owners would be allowed to water their gardens with the recycled water with no fear of redemption.

Ethical appropriateness – As this product has not been tested, we are unaware of the consequences involved. We have researched the concept of grey water thoroughly yet are not able to think of any negative consequences unless this product was implemented on a larger scale.

Functional appropriateness – This product would be efficient using filtered grey water for household duties such as washing clothing, using a dishwasher and watering the garden. Duties which do not require the use of fresh water. This product would be effective in performing each of these duties and saving water at the same time. If a buyer is interested in purchasing this product for a new home, then they will be helping the environment and saving money on water bills.

Social appropriateness – This product was designed to assist South East Queensland combat the recent water restrictions. By using the product, homeowners will be helping the environment by reducing their water usage and by providing their garden with water.

Management
To have a successful design process, students would need to:
1. Brainstorm water saving solutions around the house (INVESTIGATING, IDEATING)
2. Research water saving solutions (INVESTIGATING)
3. Select a water saving solution (IDEATING)
4. Draw blueprints of their house and incorporate their solutions (PRODUCING)
5. Collect materials to create their house (PRODUCING)
6. Possibly give jobs to each group member
7. Set time management goals and what they hope to complete in time constraints
8. Consider modifications which may be needed to achieve the desired outcome. (EVALUATING)
Safe Playground - Shannon McKinley and Jessica Boyle

Design Challenge: Safe Playground

Year Seven students have been asked to design a playground for the school yard that incorporates necessary safety features required for safe play (especially aimed at the younger year levels). The students are challenged to consider features of a playground that can be implemented to ensure students can have fun, but still ensure maximum safety is guaranteed.

Outcomes, Levels and Strands:

Technology Practice:
- TP 4.1 - Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
- TP 4.4 - Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information:
- INF 4.1 - Students analyse sources and forms of information and match these to the requirements of design challenges.

Materials:
- MAT 4.2 - Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products

Activities:
- Investigation: Students will research, gather and brainstorm ideas for a suitable design of a playground and the necessary safety requirements in order to meet their challenge. They will look at consumer (children’s) needs and wants, as well as similar playgrounds already on the market. Students will go on to examine any issues that may arise with regard to space and price requirement.
- Ideation: The students will look at possible problems that may occur and the solutions, as well as communicating effectively within their group with regards to design proposals. This is when students will begin to make product plans.
- Production: The students will begin production of their 'safe playground', they will do this through using their plans and the resources that they have gathered.
- Evaluation: The students will evaluate the appropriateness of the design and the use of materials in meeting the design requirements. They will look into investigation methods, design ideas, procedures, and the final product. These will be covered in a presentation of the final mechanism to the class.

Teaching strategies: Teacher will act as facilitator; assisting students by posing questions and offering help when needed regarding resources, content and possible clarification.

Cross-curricular Learning:

Mathematics: Students measurement and create design to scale.

<table>
<thead>
<tr>
<th>KLA</th>
<th>STRAND</th>
<th>LEARNING OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>Measurement</td>
<td>M4.1- Students choose appropriate units when estimating and measuring and explain relationships between dimension when investigating areas, volumes of prisms and lengths of boundaries of rectangles.</td>
</tr>
<tr>
<td>SOSE:</td>
<td>Place and Space</td>
<td>PS 4.2- Students predict possible consequences for an ecological system when an element is affected.</td>
</tr>
<tr>
<td>English</td>
<td>Speaking and Listening</td>
<td>Cr 2.1 When speaking, students: select particular descriptive words or phrases, body language and facial expressions, clearly defined variations in voice, music and sound effects to change the way people, places, events and things are represented.</td>
</tr>
<tr>
<td>The Arts</td>
<td>Visual Arts</td>
<td>VA 4.2- Students makes images and objects by selecting and manipulating elements and additional concepts.</td>
</tr>
</tbody>
</table>

Assessment Ideas:
- Students will be assessed on their portfolio of evidence of their work on the design model. This portfolio will include sketches, list of materials, and a journal of work completed throughout meetings.
- Students will be assessed on their oral presentation.
- Other assessment techniques will include: Peer and self assessment of the overall product, as well as observation throughout class time given for work on the design.

Context:
- Personal- Students will be analysing and exploring ideas regarding their design solution
- School- Students will operate within a school setting, working co-operatively with other students and teachers. They can also use this context to explore commonly enjoyed playground inclusions.
- Home/Family- Children speak to their family and friends concerning the possible types of designs, and the features they would be enjoyed on the playground and the different safety features that may have to be include with each one.
- Communities- Students evaluate the ‘wants’ of the children community to gain further understanding of the children’s likes and dislikes.

Appropriateness:
- Aesthetic: Is the design appealing to the eye?
- Economic: Is the design able to be economically viable and has the budget been adhered to?
- Environmental: Are the materials environmentally friendly? Do they pose a risk to the environment?
- Functional: Is the playground well designed and practical, does it work?
Resources:
Resources included a range of basic materials, household materials, re-usable materials and other materials

<table>
<thead>
<tr>
<th>BASIC MATERIALS</th>
<th>RE-USABLE MATERIALS</th>
<th>HOUSEHOLD MATERIALS</th>
<th>OTHER MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wire</td>
<td>Coloured material</td>
<td>Straw</td>
<td>Spring coil</td>
</tr>
<tr>
<td>Sticky tape</td>
<td>Fly screen mesh</td>
<td>String</td>
<td>Wine corks</td>
</tr>
<tr>
<td>Scissors</td>
<td></td>
<td>Plastic container</td>
<td></td>
</tr>
<tr>
<td>Blue tack</td>
<td></td>
<td>Tooth picks</td>
<td></td>
</tr>
<tr>
<td>Glue</td>
<td></td>
<td>Milk carton</td>
<td></td>
</tr>
</tbody>
</table>

Management:
Managing people:
- Students will work co-operatively and productively within their groups.
- Parental assistance will be greatly appreciated when class group work is required.
- All students will have access to materials.
- All safety requirements will be adhered to by students and teachers.
- Individual students with special needs will be taken into consideration.

Managing resources:
- Students are asked to bring all recyclable items found around their home.
- Students are asked to bring any unused household items.
- A letter will be sent to the parents and guardians with a list detailing the specific items.
- All basic materials will be supplied by the school.
- Students using paint are asked to bring art smocks.

Managing opportunities:
- Students should immerse themselves in opportunities at any chance available in concerns to enterprise and marketing of their design.
- The designs will be showcased in the school hall, and students will be asked to write a short description of their products to go along with the display.
- Students will also have a chance to share their design with their parents and guardians throughout Technology week.

Managing constraints:
- Students should meet the parameter of size (450mm X 450mm X 300mm).
- Cost (Below $10).
- Present their design within the time constraints (10 minutes).
- Students should also consider the challenge requirement and the due date.

Reference:
Design Challenge: Baby Mobile

Our design challenge was to create a construction which would be suitable to amuse a baby from 4-24 months old. We decided to create a unique baby' mobile. To meet the challenge, our construction needed to be baby safe, cheap to make, relatively small and most of all it would have to be bright and amusing to young children. This challenge has relevance to both personal and home and family contexts. Resources needed to complete this challenge included:

- A wooden coat hanger, ribbon, glitter glue, craft glue, fishing line, marabou feather, aluminium foil and small metal hooks;
- Miniature toys including stocking fairies and bears, and;
- Old Christmas decorations.

Outcomes

The strands of the syllabus which are relevant to this design challenge include: Technology Practice, Information and Materials. The relevant outcomes for this specific challenge include:

- TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
- TP 4.2 Students generate ideas through consultation and communicate these in detailed design proposals.
- TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
- TP 4.4 Students gather feedback to gauge how effectively their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
- INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
- MAT 4.1 Students explain how characteristics of materials affects ways they can be manipulated.
- MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

This product is appropriate according to the Sourcebook Guidelines as it meets the needs and wants of the consumer or design challenger (Queensland Studies Authority, 2003, p.10). The product is aesthetically appropriate as it uses the space well and is a pleasant sight. It is economically appropriate as it involves a low cost to create. This product is environmentally appropriate as it is partly made of recycled materials. It is ethically appropriate as it applies personal and shared beliefs to the technology and also functionally appropriate as it fulfils the intended purpose of the product.

Crosscurricular Learning

Other Key Learning Areas which are involved in this design challenge include:

- Art;
- English and;
- Maths.

Assessment

Assessment techniques which can be used in this design challenge include:

- Journals of the students creative progress;
- Portfolios or visual diaries;
- Checklists of criteria;
- Oral presentation of the finished product;
- Self and Peer evaluation of the product and;
- Teacher observation and annotations.

The investigation of the challenge relates to how the students would gather information and ideas when researching alternatives of the design challenge. Ideation takes place when students consult and communicate their ideas in detailed design proposals. Students take part in the production phase of technology practice when they physically create their product and follow production procedures. Students are in the process of evaluating when they gauge feedback of how effective their product is and how effectively it meets the design challenge and the needs of the product users.

There are little constraints to this design challenge. Time constraints are not an issue as this product does not need a specified period of time. Students can be given as little as two lessons or as much as a whole term to complete this design challenge. Neither size nor cost are a problem regarding this design challenge as most materials are recycled or are standard classroom art supplies. Size is not an issue as the product is a childrens toy and can be relatively small in size.

There is little that is needed in the form of management for this design challenge. Students can be allocated as little or as much time as necessary. The only health and safety precautions which would need to be in place would be in regards to students using hot glue guns to make their products. Students of all learning styles can benefit from this type of activity as it is hands on, uses group and individual work and is an example of guided discovery.
Jersey for the Titans - Alex Bruce and Mikaella Vercoe

Design Challenge: Jersey for the Titans

2007 is approaching fast and the Gold Coast Titans need your help. A committee has been formed to finalise the team jersey, and is requesting you come up with a prototype. The design needs to meet the criteria below...

- The jersey must incorporate the team colours yellow and blue
- The prototype should cost $10 to make.
- The prototype should be full size and wearable
- Material is to have a slight stretch
- Material is to be wrinkle resistant
- Gold Coast titans logos that need to be included are: ABC Bricks logo, Reebok logo, Telstra logo, Titans logo and the NRL logo
- Tight fitted

Outcomes, Levels and Strands:

Technology Practice
4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information
4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
4.2 Students apply techniques for transforming and transmitting information for different audiences.

Materials
4.1 Students explain how characteristics of materials affect ways they can be manipulated.
4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.
OR 5.2 Students operate equipment and apply techniques for manipulating and processing materials to meet predetermined standards.

Activities:

Investigation
The students will investigate the types of materials used to make sports jerseys. They will investigate different types of jersey construction (Stitching styles, Patterns, Sizes and fit etc).

Evaluation
Each group will present their designs to the class and students will peer assess each others designs using a criteria sheet developed by the class.

Ideation
Students will draw sketches individually and then form groups to discuss and combine ideas and develop final sketches

Production
Activity 1: Students in groups will create an A4 colour computer aided drawing of the final product and write a rationale for the design.
Extension Activity (Resources dependant): Student will create a real jersey from their design sketches using appropriate materials investigated earlier.

Crosscurricular Learning:

Key Learning Area | Activities / Applications | Strands, level and outcome |
--- | --- | --- |
Mathematics | Students record purchase and perform calculations to adhere to budget. Students produce scaled labelled drawings and exploded diagrams with measurements. | N4.1 Students compare and order whole numbers and common and decimal fractions of any size, make connections between key percentages and fractions, and describe how a range of factors influence financial decisions. M4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles. |
Science | Students investigate alternative sources of materials. | NPM4.1 Students collect information and propose ideas to explain the properties of materials in terms of each material’s underlying structure. NPM4.2 Students identify patterns in the types of change that take place in materials. NPM4.3 Students examine and assess ways that materials can be changed to make them more useful. |
English

Students will research and record information in logbooks. Students combine ideas and develop a procedural text for constructing model. Students will develop a written and oral report for the class.

Op 4.1 Speaking and Listening
Op 4.3 Writing and Shaping

The Arts (Visual Arts)

Designing and building model. Students give an oral presentation of their model to the class.

VA 4.2 Students make and display images and objects, considering purposes and audiences.
ME 4.2 Students select media forms and apply technologies to construct and present media texts to target an audience.

HPE

Group communication and collaboration

EPD4.4 Students demonstrate skills and actions that support the rights and feelings of others, while adopting different roles and responsibilities in social, team or group activities

Assessment Ideas:

<table>
<thead>
<tr>
<th>Technique</th>
<th>Anticipated Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Checklist, anecdotal records of individual students' contribution to the group.</td>
</tr>
<tr>
<td>Focused Analysis and Peer Assessment</td>
<td>Oral presentation: creative introduction, logical structure, and effective demonstration and warm delivery. Parents will be invited to sit in on presentation and act as a review panel. Report: generic structure, topic sentence and technical terms</td>
</tr>
<tr>
<td>Consultation</td>
<td>Evidence of problem solving skills. Students will keep a journal of their own personal contributions during the design challenge.</td>
</tr>
<tr>
<td>Community</td>
<td>Productive group work</td>
</tr>
</tbody>
</table>

Context:

Business: Students will ascertain the economic viability of their choices in materials.
Leisure and Recreation: Choosing appropriate style of clothing for sport chosen.
School: Students will design sports jerseys for their school interschool sports teams.
Industry: Incorporating sponsor logos into the design.
Personal: When creating individual design sketches, personal needs and wants.

 Appropriateness:
Aesthetics: Creating a design that is pleasing to the eye.
Economic: Production must be cost effective and students will create a budget. The budget needs to be built inside the allocated budget.
Functional: The jersey must be wearable if students create a final product.
Social: Students will strive to work collaboratively in groups with equal opportunity for all to share ideas and expertise.

Resources:
- Paper and pencils for sketches
- Computer with CAD and or graphic software
- Magazines and newspapers to investigating and making clippings of current sports jerseys
- Computers with internet access for investigation (logos).
- Sewing facilities for the making of the jersey (extension activity).
- Field trip to material manufacturing factory or a fabric store (Spotlight).
- Parents who have expertise in the field

Budget: Cost of materials and tools required

| Material 1.5 metres @ $4.00 per metres | $06.00 |
| Iron transfer paper 1 sheet @ $10 per 2 pack | $05.00 |
| Cotton threads | $00.00 |
| Glue and other materials | $00.00 |
| Sewing tools including machine | $00.00 |
| Scissors | $00.00 |

Total Cost: $11.00

Management:
Managing people: Students will need to manage each other in groups and teacher will need to monitor.
Managing resources: Students consider resources available to them and select ones appropriate to their design.
Managing opportunities: Students will devise a presentation to promote their design to the review board of parents.
Managing constraints: Students will need to ascertain their limitations in resources and skills and design accordingly.
Design Challenge: Income generating recycling system for schools
You live in a rural country town near Wivenhoe in South East Queensland. You have minimal supplies of water and power and global economic factors (eg. War in Iraq, cyclone Larry) have increased living costs. You have been asked to develop new initiatives to help the school become more self-sustainable and income generating. The challenge is to design and construct a model of an eco-friendly school that can sustain itself to reduce the usage of the earth’s non-renewable resources.

Outcomes, Levels and Strands:

Technology Practice
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges. Interviews, Internet, reference books used to research precious resources and develop ways to save them and recycle them in a school setting; TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals. In groups, brainstorm ideas and choose one to construct and present to the whole class highlighting the benefits and cost of design; TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users. Students are to allocate a role for each member according to their specific skills, interests and abilities; TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users. The design model is assessed by a judgment panel (rest of class) using a specific criteria which has been developed by the whole class.

Information
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges. Students can identify credible sources and relevancy; INF 4.2 Students apply techniques for transforming and transmitting information for different audiences. Students present their design model to different panels (such as students from other year levels, parents, teachers etc) taking into consideration audience knowledge and language used.

Materials
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated; MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Systems
SYS 4.1 Students identify and explain the logic of systems and subsystems. Students explain how their systems will be beneficial to the earth; SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems. After feedback from teachers, parents and peers the students should be able to go away and modify their system in order to make it a better working version.

Activities

Investigating
Students research various designs of water retaining systems and eco-friendly power production designs using the Internet, magazines, newspapers, journals, brochures and human resources. Students interview members of the community to discuss appropriate designs which could assist the school to be income generating. Students should note the characteristics and structures that assist in conserving water and energy in addition to various environmentally friendly technologies. Students interview materials which are most appropriate for construction and research recyclable materials that they could use to build their model. Students reflect in daily diaries.

Ideating
In groups, students collaborate ideas and begin brainstorming and combining information from their research to come up with designs that meet the parameters and criteria. Students then decide which materials and characteristics they will use to design the school whilst taking into consideration conflict resolution, clear communication and listening skills. Students then collect pictures from various sources and begin to develop a portfolio which includes these and brainstormed ideas, sketches, material samples, an estimated budget of costs of their design. Students begin to gather recyclable materials from home, shopping centres, parks, rubbish dumps, and other community resources (ie. Construction sites) which would be suitable for building their school. Students must take into consideration the $10 budget and the size of their design. Students reflect their progress in daily diaries.

Producing
Students finalise their design and materials required for construction. Students write a series of steps towards developing their eco friendly school. Students also consider safety procedures which they adhere to when using dangerous tools and used under adult supervision. Students begin to construct their eco friendly school using the recyclable materials. During the production process students work collaboratively and continually evaluate their input into the group. Students reflect their progress in daily diaries.

Evaluation
Students record the difficulties and problems which occurred during the production process such as lack of input from certain members and conflicts that might have arose. Students present their construction to their peers highlighting the materials, underlyings characteristics that might not be visible and other positive features of the school model. Students justify the material and design choices made during the construction process. Students discuss the appropriateness of their designs and the processes involved in creating a working model. Students compare designs during a gallery walk and discuss pros and cons of other models and identify features which are most aesthetically pleasing, eco-friendly and income generating. Students review their progress of the construction in their diaries and make a final contribution, rating their overall development.

Crosscurricular Learnings

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand, Level and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>• Portfolios</td>
<td>Op3.1 When speaking, students: use logical sequence when organising idea, use stages of generic structure, patterns of clauses, text connectives, conjunctions and specialist words according to the text type and medium, use statements, questions and commands to generate and maintain discussions and conversations, use processes and attributes that offer opinions, speak audibly and with clarity by using projection, articulation and appropriate volume.</td>
</tr>
<tr>
<td></td>
<td>• Written and oral interviews with community members</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Oral Presentations</td>
<td></td>
</tr>
<tr>
<td>Maths</td>
<td>SOSE</td>
<td>HPE</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------------------------------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>• Budget constraints</td>
<td>• Environmental issues</td>
<td>• Considering safety</td>
</tr>
<tr>
<td>• Measurements of school</td>
<td>• Reduce, Reuse, Recycle</td>
<td>• Being alert of hazardous/</td>
</tr>
<tr>
<td>• Spatial elements</td>
<td>• Sustainability</td>
<td>risk situations</td>
</tr>
<tr>
<td>• Scale drawings of model</td>
<td>• Cooperative group work</td>
<td>• Group work and negotiation</td>
</tr>
<tr>
<td></td>
<td>• Decision-making</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S 3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids; M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
<td>PS3.1 Students compare how diverse groups have used and managed natural resources in different environments; PS3.3 Students cooperatively collect and analyse data obtained through field study instruments and surveys, to influence the care of a local place; PSD3.6 Students cooperatively identify an environmental issue of concern and contribute to its resolution; SRF3.1 Students make inferences about interactions between people and natural cycles, including the water cycle.</td>
<td>PH3.3 - Students identify potentially hazardous situations and demonstrate actions to respond to unsafe and emergency situations. Enhancing Personal Development</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Assessment Ideas:**

**Observation:** Take photos of student interaction and make notes of student progress
**Student folio of Design Challenge:** Portfolio of student work including: Work samples, diary reflections; design plans/sketches; resources/budget; modifications; list of information resources
**Consultations:** Anecdotal records of student interaction and progress
**Peer and Self Assessment:** Written reflections and progress in design journals; Peer assessment sheets during gallery walk

**Criteria Sheet:** Anticipated evidence of criteria

**Context:** Global: Through researching schools from around the world, students gather information on different designs which suit different global environments. Students also develop environmental awareness of water cycles and the effects of drought on the environment and suburban life.
**Business:** Students consider the factors encountered when marketing their building designs and when faced with council approval or disapproval.
**Communities:** Through group collaboration and community consultation, children can share their ideas with friends and neighbours which can increase public awareness and multiply water and power conservation.
**Home and Family:** Students consider the effects of income generation on school expenses (schools provide textbooks and therefore reduce fees and expenses)
**Personal:** Students work on interpersonal skills and communicating and incorporate their personal needs and wants into the designing and construction of their school.

**Appropriateness:**
**Aesthetic:** Is the design appealing to students, teachers and community members? Is it built to the right proportions?
**Economic:** Is the school design affordable to make? Is it financially viable?
**Environmental:** Are the materials that the house is built from environmentally sound?
**Functional:** Are elements of the school functional for daily school life?

**Resources:**
Students are encouraged to bring in materials from home, school and the community to be recycled in their construction and are offered school materials so as to keep costs to a minimum.

**Management:**
**Managing people -** Students work in groups of two or three. Need effective team work, cooperation and participation from group members. Group rules and responsibilities may need to be addressed to assist this occurring.
**Managing resources -** Selection of materials for design model to be sourced from recycled or left-over supplies from home, local business, or school resource area. (basic resources will be provided such as glue, scissors). Safety of individual group members must be taken into consideration when using these resources. (No power tools used)
**Managing opportunities -** Each group will present their design for no more than 5 minutes, highlighting its features. They will include their 2D sketch, materials used, elements that are important and any problems that they had during the construction process. There will be time for questions and answers from their peers. The class will present their design to the panel of judges.
**Managing constraints -** Managing constraints: Students will be required to construct their design model to a financial budget of $10 or less. Maximum size of the design model is: 450mm x 450mm x 350mm. Students must hand in a 2D Sketch 1 week prior to presenting.
Design Challenge: Sustainable Outback House

A new settlement of early outback settlers needs your help, in pairs you will travel back in time to the year 1860; the location is the outback in western Queensland. Your mission is to design and create a sustainable outback house. The settlers’ house designs are not suited for the location or climate, you need to create a better design; the houses also have no electricity or running water, so if you want to use power and have water you must invent environmentally sustainable ways of doing so, e.g., solar power, bio mass etc. You will need to explore current technologies on sustainability and implement them. You may even improve upon them or create some new technologies along the way.

Guidelines: You have a design budget of $10 altogether, you must use recyclable materials and your design must be no bigger than 450mm x 450mm x 300mm. You will do a small presentation of your design challenges to family and classmates on our Environmental Fair night. Good luck with your mission year 5.

Outcomes, Levels and Strands:

Technology Practice
TP3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting the design process.
TP3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.

Information
I3.1 Students describe advantages and disadvantages of different sources and forms of information.

Materials
MAT3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Systems
SYS3.1 Students identify and describe relationships between inputs, processes and outputs in systems.
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:
Investigation – examining, analyzing, gathering and researching information to meet the design challenge.
Students will:
- Gather information identifying environmentally sustainable ways to create power, water technologies, and house designs
- Use a range of recycled materials to construct the design challenge

Ideation – generating, communicating, planning and designing to meet the design challenge.
Students will:
- Work in pairs and generate ideas that will help with the plan and design of the design challenge.
- Students will use a concept map to organize their ideas.
- Consider possible problems they could encounter and solutions to these
- Design house plans, environmental technologies and choose the best one.

Production – creating, developing, managing and making
Students will:
- Stick to the production budget guidelines
- Manage Resources properly to ensure this
- Use recyclable materials in constructing the outback house
- Consider safety when using glue and paint.

Evaluation – testing, judging, reflecting and comparing to meet the design challenge.
Students will:
- Keep a reflective journal detailing their thoughts and challenges of construction, also resources used and budget
- Make a photo journal detailing each development stage
- Discuss and compare their design and the appropriateness of their design when they present on the Environmental Fair night.

Cross-curricular Learnings

<table>
<thead>
<tr>
<th>Related Learning</th>
<th>Strand, Level and outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Writing and Shaping - Cu 3.3 When writing and shaping, students: select relevant genre and medium</td>
</tr>
<tr>
<td></td>
<td>Op 3.3 When writing and shaping, students: Organise and link ideas using generic structure, layout, and text connectives, conjunctions and referring words</td>
</tr>
<tr>
<td></td>
<td>Reading and viewing - Cu 3.2 When reading and viewing, students: Interpret subject matter by making connections between directly stated information to identify main ideas and supporting details.</td>
</tr>
<tr>
<td>Maths</td>
<td>S 3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids.</td>
</tr>
<tr>
<td></td>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
</tr>
</tbody>
</table>
| SOSE                              | Changes in design over time | TCC 3.1 Students use evidence about innovations in media and technology to investigate how these have changed society.
| Environmental issues              | PS 3.1 Students compare how diverse groups have used and managed natural resources in different environments
| Sustainability                   |                           |
| Science                          | Students look at alternative energies | 3.3 Students identify different ways of obtaining energy.

**Assessment Ideas:**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| **Observation of resources, design and construction** | - Use a checklist and anecdotal records to assess
- Photographic records (digital camera)
- Student portfolio (including: sketches, photographs and reflective journal) |
| **Consultation**                              | - The teacher consults with each pair through design and construction                               |

**Context:**

Communities – The design of the sustainable outback house will reflect the ideas and needs of the early settlers’ community and desert living, i.e. the need of appropriate shelter, power and water.

Global – Through global research (via internet) students find information pertaining to sustainable house designs, solar energy, bio mass energy, and wind power, then decide which is appropriate for their context.

** Appropriateness:**

Cultural – Will this design meet the needs and requirements of a certain community group (early settlers)?

Aesthetic – Will the outback house blend with the environment or be an eye saw?

Economic – Will the budget be adhered to and how much would it cost for an early settler to build?

Environmental – What impact will the outback house have upon the environment? How sustainable will it be?

Functional – Will the design be functional; will it compliment the environment and surrounding community?

**Resources:**

- Teacher to provide basic resources, i.e. glue, scissors, paper, clay – all other materials must be primarily recyclable and are to be collected or bought by the students. Resources that could be used are: paddle pop sticks, fabric, de-headed matchsticks, sand or paint.
- Students are to manage resources with care and restraint

**Constraints:**

$10 budget; no bigger than 450mm x 450mm x 300mm.

**Management:**

Managing people - Students are to work in pairs cooperatively and collaboratively. There is to be equal contribution.

Managing resources – Students are to use primarily recyclable materials. Students must manage resources efficiently.

Managing opportunities – use problem-solving skills in designing sustainable house. Students plan, manage and organize resources.

Managing constraints - Budget $10 strictly adhered to. No power tools to be used.

Design Challenge: You Rule the School!
Students have been advised that the Department of Education intends to sell half of the land on which their school stands. One half of the land will be sold to developers for a residential project. On the remaining land, the school will be rebuilt. The Design Challenge is to redesign the school, giving consideration to the rising student population and most effective use of the remaining land. Students will choose one component of the school to construct which MUST include one innovative design concept. Students will work within a budget of $10.00 and a size restriction of 450mm x 450mm x 300mm.

Outcomes, Levels and Strands:
Level 4
Technology Practice
TP4.1 – Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 – Students generate ideas through consultation and communicate these in detailed design proposals.
TP4.3 – Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP4.4 - Students gather feedback to gauge how effectively products meet the needs of specific users.
Information
INF4.1 – Students analyse sources and forms of information and match these to the requirements of design challenges.
Materials
MAT4.1 – Students explain how characteristics of materials affect ways they can be manipulated
MAT4.2 – Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Activities
**Investigation** is carried out to gather knowledge, ideas and data for use in meeting design challenges.
Students conduct a field study of space constraints regarding land availability. Research standard facilities within Primary school settings (library, SAC, classrooms, admin).
Students ‘Brainstorm’ a list of questions to survey staff and students in relation to the positive and negative aspects of the current school design.
Students conduct research regarding Health and Safety requirements.

**Ideation** is undertaken to generate and communicate ideas that meet design challenges, and to justify the selection of these ideas.
Giving consideration to data collected, students design and draft labelled school design layout.
In groups, using butcher’s paper, students develop a ‘Concept Map’ of all available resources that may be required to complete project. Present and compare all suggestions to compile a single, manageable list.
Students select one aspect of overall layout to construct.
Students ‘Think, Pair, Share’ to produce their design plan and aesthetic appearance of their model.

**Production** procedures can be identified, described and managed when making products that meet design challenges.
Students discuss and produce a ‘Timeline’ of activities necessary to complete design idea.
Students negotiate and allocate design tasks.
Students construct their model.
Students create a PowerPoint presentation to showcase their design challenge.

**Evaluation** is undertaken to make judgments about the appropriateness of design ideas, processes and products when meeting design challenges.
Students periodically re-evaluate design concepts and construction methods to ensure the intended purpose is achieved.
Students compare initial conceptualisations to finished product and discuss and analyse the variations between the two.
Students reflect upon, and record the effectiveness of their overall design challenge experience.
Students display projects in a ‘Gallery Walk’ exhibition.

Cross-curricular Outcomes:
**Mathematics** –
M4.1 Students use appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and length of boundaries and rectangles. (measuring and creating plans)
N4.3 Students identify and solve multiplication and division problems involving whole numbers, decimal fractions, common fractions, percentages and rates, selecting from a range of computation methods, strategies and know number facts. (Conversion of measurements to scale)

**English** -
CR4.2 When reading and viewing, students identify relevant information and draw conclusions. Identify likely audience of text. (Research and investigation)
CU4.3 When writing and shaping, students organise subject matter that develops a topic or storyline, supports a point of view or offers an explanation. (Reflective journal)

**SOSE** -
PS4.1 Students make justifiable links between ecological and economic factors and the production and consumption of a familiar resource. (Investigation of available and recyclable building materials, geographical considerations)

**Science** -
EC4.3 Students present alternative ways of obtaining and using energy (including energy from the sun and from fossil fuels) for particular purposes. (Possible inclusion of alternative power source)
The Arts - ME4.2 Students select media forms and apply technologies to construct and present media text to target an audience. (Powerpoint presentation)
VA4.2 Students make and display images and objects considering purposes and audiences. (Decoration of design challenge)

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Source of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>➢ Individual participation</td>
</tr>
<tr>
<td></td>
<td>➢ Positive attitude toward activities</td>
</tr>
<tr>
<td></td>
<td>➢ Effective research methods</td>
</tr>
<tr>
<td></td>
<td>➢ Group participation and progress</td>
</tr>
<tr>
<td></td>
<td>➢ Checklist</td>
</tr>
<tr>
<td></td>
<td>➢ Anecdotal notes</td>
</tr>
<tr>
<td>Consultation (as above)</td>
<td>➢ Student/teacher consultation</td>
</tr>
<tr>
<td></td>
<td>➢ Group discussions</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>➢ Design drafts</td>
</tr>
<tr>
<td></td>
<td>➢ Reflective Journal</td>
</tr>
<tr>
<td></td>
<td>➢ Final product</td>
</tr>
<tr>
<td></td>
<td>➢ Powerpoint presentation</td>
</tr>
<tr>
<td></td>
<td>➢ Portfolio</td>
</tr>
</tbody>
</table>

Context:
Community – Students consider the impact of an increase in population within their community
School – Students are aware of the needs of their school population and take these into consideration when producing their design challenge for maximum functionality.
Personal – Students own ideals and preferences are incorporated into their designs.
Leisure and Recreation – Students consider the range of leisure and recreational activities accessible to students in a primary school environment.

Appropriateness:
Aesthetic – Is the model visually appealing? Is the model built to scale?
Cultural & Social - Does the model cater for the needs of all students, particularly minority or disadvantaged groups?
Economic – Was the design constructed within the budgetary guidelines?
Environmental – Has the environmental impact of the design been considered?
Functional – Is the model realistic and practical in its design.

Resources:
Students are encouraged to use pre-owned and recycled materials to reduce costs. A range of materials may be available as school resources. Materials may include Timber, Hardware, Paint, Paddle-pop sticks, Paper, Toothpicks, Craft supplies, Computer graphics, Lighting & components, Batteries, Fabric. Emphasis is placed on the budgetary guidelines.

Management:
Managing people - Students are to be respectful of safety regulations whilst in the classroom.
Children are responsible for delegating responsibility within the group
Parents are notified in writing of the design challenge parameters, and that parental input should be kept to a minimum.

Managing resources - All materials and resources are available equally to each student.
A specified area is allocated for the safe storage of Design challenges in progress.

Managing opportunities – Students will present completed Design Challenges in a ‘Gallery Walk’ to peers, parents, faculty, and community leaders who will provide constructive feedback and appraisal.

Managing constraints – Students are guided by the Design Challenge boundaries, and are to complete the project within one term.
Eco Friendly Home - Holly Wilkie, Jacqui Lather and Claire Roberts

Design Challenge: Eco Friendly Home
We are killing the world around us by choking the environment with pollution and destroying our natural resources. The end of life on earth could be closer than once predicted! Saving our planet begins at home. So Year 7, help our planet by designing and developing an ecologically friendly house, while critically considering the appropriateness of the proposed design in terms of its positive and negative impacts on the environment. The constraints...your budget must not exceed $10 during the research, design and development of the finished product, and The design must be built within the parameters of 450mm x 450mm x 300mm. Good luck Year 7, the fate of our planet rests in your hands!

Outcomes, Levels and Strands:
Technology Practice
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
Information
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.
Materials
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.
MAT 4.2 Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.
Systems
SYS 4.1 Students identify and explain the logic of systems and subsystems.
SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems.

Activities:
Investigation: Gathering knowledge, ideas and data to meet design challenges
Students will analyse their challenge, what they aim to produce and the constraints they have to align with. They will build knowledge of the product – ‘an ecologically friendly house’. Information is gathered through consultation (questioning and interviews) with people whom are knowledgeable in this field or could be a potential user of an eco-friendly house. Research is also conducted using the internet (websites and online communication), newspapers, magazines and journals. The knowledge, ideas and data gathered by students needs to be clearly organised and analysed allowing the students to show their interpretation, alternative opinions, accuracy and overall relevance.

Ideation: Generating and communicating ideas that meet design challenges
Students use their research in order to generate ideas for meeting the design challenge. They will brainstorm and collaborate ideas in order to decide on specific characteristics that the house will contain. Students discuss what recycled materials and purchased materials they could use to build their model and any safety procedures they will need to adhere to. Students will start the production of their house by first producing a 2 dimensional sketch and submitting it to the teacher. It is to be detailed as it is a basis for construction and an appropriate scale must be decided on.

Production: Making products to meet design challenges
Students gather their design materials and tools, and decide upon a sequence of procedures they intend to follow in constructing their house. While building the model they negotiate any ramifications as a group and develop it cooperatively. Students evaluate the model as well as their individual input during production. The students build the house meeting the predetermined $10 budget and 450mmx450mmx300mm size parameters.

Evaluation: Judging the appropriateness of design ideas, processes and products when meeting design challenges
Students evaluate their design, materials used and overall success of their product in meeting the design challenge. They will present their house to the class and discuss any difficulties that occurred during production and any improvements they would make given another opportunity to design the house. Characteristics students implemented into the house design should be identified and justified to the class and a final comparison should be drawn between the initial design ideas and the final product.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand, Level and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Researching</td>
<td>Reading and Viewing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cu 4.2 When reading and viewing, students: identify cultural purposes within texts; infer meanings that are not directly stated from familiar and unfamiliar subject matter and identify relevant information and draw conclusions.</td>
</tr>
<tr>
<td></td>
<td>Presenting</td>
<td>Writing and Shaping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cu 4.3 When writing and shaping, students select subject matter according to purpose, text type, audience and medium.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Speaking and Listening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cu 4.1 When speaking, students: choose subject matter and medium that takes account of whether listeners are known or unknown, develop a main idea or point of view providing some supporting details and evidence to explore ideas and issues and offer opinions and attempt to persuade others of an opponent's view.</td>
</tr>
<tr>
<td>Math</td>
<td>Collecting Data</td>
<td>Chance and Data</td>
</tr>
<tr>
<td></td>
<td>Budgeting</td>
<td>CD 4.2 Students plan and carry out data collections using their own data record templates, choose and construct appropriate displays and make comparisons about the data based on the displays and measures of location, number.</td>
</tr>
<tr>
<td></td>
<td>Using scale/ measuring the house</td>
<td>N 4.2 Students identify and solve addition and subtraction problems involving whole numbers and common and decimal fractions, selecting from a range of computation methods, strategies and known number facts.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S 4.2 Students interpret maps and plans with reference to conventions including latitude and longitude for maps and describe movements using compass points and distance.</td>
</tr>
</tbody>
</table>
### Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment Technique</th>
<th>Source of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Teacher observes student progress, taking notes or using a checklist.</td>
</tr>
<tr>
<td>Consultation</td>
<td>Teacher meets with students individually and with their group to discuss problems, progress and thoughts. Teacher meets with parents if possible to discuss individual student progress at home.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Teacher examines student products such as notes, concept maps, graphs and data, journal entries (if applicable), diagrams, photos and worksheets.</td>
</tr>
<tr>
<td>Peer and Self Assessment</td>
<td>Students reflect on their progress in their journals or to another classmate. Students fill out peer and self assessment checklists within their group to note progress and participation levels.</td>
</tr>
</tbody>
</table>

### Contexts:

- **Agriculture:** The Eco-friendly house design challenge allows students to research and understand principles and issues relevant to agriculture when deciding on what flora and fauna to conserve attract and incorporate in their design. (Specific relation to trees and plants, the vegetable garden, animals wanting to be attracted or distracted from the house, and water issues.)
- **Global:** Through researching eco-friendly and sustainable houses, students learn about needs, environments and houses which should be developed in different areas of the world.
- **Business:** Students learn how to market and accord to building design constraints such as council and environmental constraints.
- **Communities:** Students evaluate the impact of their housing design on communities, considering economic social and environmental sustainability and needs.
- **Home and family:** Students evaluate family and home needs while considering the environment.
- **Industry:** Students learn about the effect that energy industries and housing development industries have on the environment.
- **Personal:** Students work on their interpersonal skills, such as problem-solving, personal management skills, inferring and reflecting.
- **School:** Students evaluate school buildings and designs.
- **Leisure and recreation:** Students consider how home owners can relax and enjoy themselves at home while considering the environment.
- **Appropriateness:**
  - **Environmental:** Does the house feature eco-friendly elements? What are the impacts on the environment?
  - **Aesthetic:** Does the house use aesthetically appealing design principles?
  - **Economic:** Are the elements of the house affordable and economically viable?
  - **Functional:** Are the elements of the house functional to comfortably live with? Are the materials used functional, serve a purpose and are eco-friendly?
  - **Social:** Can people enjoy and want to invite people to the house?

### Management:

This design challenge involves students working together to co-ordinate their creative ideas and technical knowledge to develop an environmentally friendly house. Through it they should learn how to collaboratively manage **People, Resources, Opportunities and Constraints.**

In regards to:

- **People:** Students manage group dynamics, group rules, responsibilities, values and goals, co-operate and equally participate in the design challenge and learn group work skills. Teachers and parents should also keep their input to a minimum and this should be accorded to throughout the design challenge to maximise student learning and development.
- **Appropriateness:**
  - **Environmental:** Does the house feature eco-friendly elements? What are the impacts on the environment?
  - **Aesthetic:** Does the house use aesthetically appealing design principles?
  - **Economic:** Are the elements of the house affordable and economically viable?
  - **Functional:** Are the elements of the house functional to comfortably live with? Are the materials used functional, serve a purpose and are eco-friendly?
  - **Social:** Can people enjoy and want to invite people to the house?

- **Opportunities:** Students will be able to present their design at a class ‘Trade Fair’ for 5 minutes, presenting a PowerPoint of their ‘Design Challenge Journey’ and submitting a Design Portfolio, including their 2D Sketch and construction principles. Interaction with peers and a time for questions and discussion will be catered for at the end of individual group presentations.
- **Constraints:** Students need to accord to the design parameters of 45cm x 45cm x 30cm, materials which are available and the $10 Budget. The students also have a unit duration of 8 weeks to research, complete and present their design and a 2D sketch needs to handed in to the teacher before construction begin.

### Resources:

Students can use materials of their choice but have to accord to the budget of $10. Materials found around the home and at school can be used. Recyclable materials and materials bought from stores/shops can be used. For the teacher’s house off cuts of wood, cardboard, paddle-pop sticks, sponges, matchsticks, Oasis material, chair feet, paint, glue, rocks, mosaic tiles, paper and paper clips were used. These materials were found at home or bought considering the $10 budget from Bunning’s (Hardware store), Spotlight (Homemaker store), Newsagents and Two-dollar shops.
Design Challenge: The Me-Bag. What carries a little carries a lot!
Leela from Futurama needs your help, she has a message for you………..

"Hey kids, it’s Leela here. I have a challenge for you. In groups of 3, over the next 6 weeks, I want you to design an easier way of carrying your things to school each day. Remember, some kids travel by bike, bus, car, train, taxi or on foot. Your solution should work now and in the future."

The product/process must meet the 7 types of appropriateness. Show the processes that you went through from initial thoughts to final production and present this in a 5 minute presentation to your peers.

Outcomes, Levels and Strands:

Technology
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.
INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.
SYS 4.2 Students incorporate feedback to refine and modify systems and/or sub systems.

Activities:
Investigation – (i) Research medical experts on the internet - What affects to back packs have on children’s health? (ii) Do a questionnaire for parents and other students on their requirements of a carrying device in such as a chiropractor to talk about how back packs cause back pain. (iv) Identify the difference between needs and wants of the chosen product. (v) Investigate all current options available, possible materials, other uses, weight and size of bag, costs of materials. (vi) Research latest electronics technology on the internet. (vii) Different sizes and strengths of people using the product. (xiii) Consider colours and marketing logos that appeal to the target audience. (ix) Investigate carrying methods from other countries (eg. on your head). (x) Brainstorm and list the items that students bring to school eg. lunch, hat, books and homework.

Ideation – (a) Use Buzan’s mind mapping or SCAMPER to allow the students to brainstorm their ideas in groups of 4. (b) Use Ryan’s Thinkers Keys to determine the disadvantages of the product or a different target audience. (c) Use the ‘Fish Bone’ activity to choose the top three ideas and decide on the final product.

Production – (a) Draw a model of the product (to scale). (b) Modify the product (to scale). (c) Make it work (to scale). (d) Make a prototype using a variety of materials. (e) Make a model (to scale). (f) Add enhancements.

Evaluation – (i) Use De Bono’s six thinking hats to evaluate the design. (ii) Use ‘Numbered Heads Together’ to ensure that all students in the group are knowledgeable on the product. (iii) At the end of the unit, exhibit products in a ‘Gallery Walk’ for parents and peers to view. (iv) Invite a specialist judge to make comments on the products. (v) Do a role play of “The New Inventors” to decide on the best product. (vi) Take photographs of each team and their model and display in the classroom.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcome</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>M 4.1 Topic - Length, mass, area and volume and S 4.1 Topic - Shape and Line.</td>
<td>♦ Length, mass, area, scale, volume, shape and line.</td>
</tr>
<tr>
<td>Science</td>
<td>SS 4.1 – Cultural influences. SS 4.3 – Short and long term effects on environment, communities and individuals. EC 4.1 – Relationships between forces, motion and energy. EC 4.2 - The transfer and transformation of energy (eg. electricity).</td>
<td>♦ Determine the effect of weight on different materials. ♦ Electricity and energy activities. ♦ Research biodegradable materials and their structure.</td>
</tr>
<tr>
<td>HPE</td>
<td>PH 4.4 Students justify the selection of health products and services that best meet their health needs.</td>
<td>♦ Effects of carrying weight on the body.</td>
</tr>
<tr>
<td>English</td>
<td>OP 4.2 Writing and Shaping CU 4.1 Reading and Viewing</td>
<td>♦ Oral presentation ♦ Written report on product ♦ Reading books and the internet.</td>
</tr>
<tr>
<td>SOSE</td>
<td>TCC 4.4 Critique information sources to show the positive and negative effects of a change or continuity on different groups. PS 4.1 Students make justifiable links between ecological and economic factors and the production and consumption of a familiar resource. PS 4.2 Students predict the impact of changes on environments by comparing evidence. OI 4.3 Students debate how media images concerning gender, age, ethnicity and ability reflect groups to which they belong.</td>
<td>♦ Look at recyclable products and materials. ♦ Discuss appropriateness relating to products. ♦ Look at futures wheel. ♦ View media – target audiences.</td>
</tr>
</tbody>
</table>
ICT

<table>
<thead>
<tr>
<th>ICT</th>
<th>ACI 4.1 Students access information from electronic sources, including the internet, using operational search strategies.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DCP 4.1 Students describe how design elements and principles, genre conventions and technical constraints in digital communication and publishing meet the needs of specific audiences.</td>
</tr>
<tr>
<td></td>
<td>DCP 4.1 Students create digital communication and publishing products for a particular audience within an identified genre convention and justify their use of design elements and principles.</td>
</tr>
<tr>
<td></td>
<td>DCP 4.3 Students analyse issues related to the use of a variety of digital communication and publishing media.</td>
</tr>
<tr>
<td></td>
<td>♦ Powerpoint presentation showing technology process.</td>
</tr>
<tr>
<td></td>
<td>♦ Use Word to do a marketing poster.</td>
</tr>
<tr>
<td></td>
<td>♦ Use video or camera to illustrate the product.</td>
</tr>
<tr>
<td></td>
<td>♦ Use the internet to research benefits and disadvantages of digital communication.</td>
</tr>
</tbody>
</table>

Assessment Ideas:

♦ Make a criteria sheet and discuss it with the students after they have been told about the challenge so that they can tick off the checklist where they have met required elements. (Self-evaluation).

♦ The assessment should cater for the students’ range of interests and learning styles (Gardener’s 8 intelligences).

♦ A team oral presentation of their product.

♦ Make a portfolio made up of each phase of the technology process.

♦ Teacher’s observations of group communication and negotiation.

♦ Students review the product using Edward De Bono’s six thinking hats and the 7 aspects of appropriateness.

♦ Peers review the product using a role play of “The New Inventors”.

Context:

The students should be working in multiple contexts. For examples, a personal home-school context but at the same time consider a global systems and design context.

Appropriateness:

Ethical – The product will be backwards compatible when future models are brought out. A camera was not included in the product due to ethical reasons. Finger printing/retinal scanning has been included in the product but it may conflict with privacy laws.

Environmental – The product is made from biodegradable corn starch plastic that has a minimum decomposition of 60 days (http://www.science.org.au/nova/061/061key.htm). The circuit board is also made from biodegradable materials.

Economic – The model was made for less than $10. However, the actual product would retail for between $150 and $350 to compete with today’s mobile market pricing.

Cultural – All nationalities can use this product as it is voice activated and the keys use images as symbols rather than Western style letters. People who are deaf or dumb would only be able to use some features of the Me-bag.

Functional – It carries work/money from home to school. The products are engineered to meet functional performance requirements and durability with replacement parts available. The products are marketed with a 6 month warranty provision. The product will work on any mobile and GPS network.

Social – Schools would have to have a funding program to help students from low socio-economic backgrounds so that there was not any social disadvantage.

Aesthetic – It has been designed to appeal to both boys and girls between the ages of 5 and 16. A marketing logo such as Nokia adds appeal along with cross-marketing with a trademark such as Futurama, The Simpsons etc. Colours and finishes are important to children so this was a considered.

Resources:

Websites  
http://www.engadget.com/2006/08/02/ichat-mobile-is-it-the-iphone-part-forty-bajillion/  
http://tech.yahoo.com/blog/hughes/1161 and http://tech.yahoo.com/blog/hughes/66  
http://www.youtube.com/watch?v=JqKEe_JEo9g&NR  
http://www.m-learning.org/which.shtml  
http://www.plusminus.ru/call.html  

Cost to produce model

| Material (scrap) | $0 |
| Cardboard (scrap) | $0 |
| Buttons | $2.99 |
| Velcro | $1.99 |
| TOTAL Budget | $4.98 |

Management:

Managing people

♦ Respect all opinions and give all members a chance to talk

♦ Use communication techniques such as good questioning/listening, sharing and negotiating fairly.

♦ Determine the individual strengths within the team and elect an overall leader.

♦ Consider safety measures.

Managing resources

♦ Investigate what materials are available and who is responsible for them.

♦ Ensure that computers are available when the team is meeting.

Managing opportunities

♦ Do you know any specialists that can help with the design, modeling or production?

♦ Let your imagination run wild and go back to the drawing board if necessary.

♦ Is their already a product on the market similar to yours?

Managing constraints

♦ Work within the $10 cost constraint, the size constraint of 450mm by 450mm by 300mm and the 1 hour per week for 6 week time constraint.

♦ The model does not have to be fully functioning but must be able to demonstrate its functions.
Design Challenge: Water 2 Water
Your local city the Gold Coast is currently under tight water restrictions due to drought, your job is to create a water recycle storage systems for the average home, staying in a size limit of 450 x 450 x 300mm for your model.

Outcomes, Levels and Strands:
Technology Practice:
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.

Materials:
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Systems:
SYS 3.1 Students identify and describe relationships between inputs, processes and output systems.

Activities:
Investigation – In groups of three students will investigate different water tank recycle systems by examining, analyzing and gathering data. (Students will be provided with the necessary resources, book, pamphlets, internet etc. to use in researching the questions posed on water tanks and recycling systems.)
Ideaion – From investigating water tanks and recycle systems, students will have generated ideas for the planning and design process of the water recycle storage system.
Production – As a group of three the students will assign roles to aid in creating and developing the model required.
Evaluation – Students will be required to judge each groups model out of a mark of ten through a gallery walk. After the students have completed judging they will then reflect upon their model as well as comparing to others.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>STRAND</th>
<th>OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>Science and Society</td>
<td>3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects.</td>
</tr>
<tr>
<td>Science</td>
<td>Earth and Beyond</td>
<td>3.1 Students identify and describe some interactions (including weathering and erosion) that occur within systems on earth and beyond.</td>
</tr>
<tr>
<td>Science</td>
<td>Life and Living</td>
<td>3.3 Students describe some interactions (including feeding relationships) between living things and between living non-living parts of the environment.</td>
</tr>
<tr>
<td>English</td>
<td>Speaking and listening</td>
<td>3.1 When speaking, students: Make choices of subject matter depending on audience, purpose and medium.</td>
</tr>
<tr>
<td>English</td>
<td>Reading and Viewing</td>
<td>3.3 When writing and shaping, students: Choose aspects of subject matter and particular attributes, processes and visual resources to construct positive or negative representations of people, places, events and things.</td>
</tr>
<tr>
<td>Arts</td>
<td>Visual Arts</td>
<td>3.2 Students make and display images and objects, understanding the functions of informal and formal display.</td>
</tr>
<tr>
<td>Studies of Society and Environment</td>
<td>Time, Continuity and Change</td>
<td>3.3 Students use knowledge of people’s contributions in Australia’s past to cooperatively develop visions of preferred futures.</td>
</tr>
<tr>
<td>Studies of Society and Environment</td>
<td>Place and Space</td>
<td>3.2 Students create and undertake plans that aim to influence decisions about an element of a place.</td>
</tr>
<tr>
<td>Studies of Society and Environment</td>
<td>Systems, Resources and Power</td>
<td>3.1 Students make inferences about interactions between people and natural cycles, including the water cycle.</td>
</tr>
</tbody>
</table>

Assessment Ideas:
Observation – Observation of group work, are the students working cooperatively sharing ideas and participating equally within the group.
Consultation – Teacher observes students progress through working portfolio and discusses the development at the end of each building stage.
Focused Analysis – Students will take part in an oral presentation of their model and then they will participate in a gallery walk, and as a whole class discuss each models design and processes.
Peer and Self Assessment – Students will grade each model out of ten whilst carrying out a gallery walk, and will self assess using a criteria sheet.

Context:
Students will investigate and ideate their home, school and local community about the issues of water and drought. They will also look at national and global communities and industries.

Appropriateness:
Aesthetic - Does the model use the appropriate materials for the use of a water tank?
Economic - Is the water solution cost effective to the average home owner/user?
Environmental - Does the product use any recyclable materials that are not harmful to the environment? And is the product beneficial to the environment in the long term?

Functional - Does the water solution serve its intended purpose of recycling water?

Resources:
Majority of resources used were found around the home and office only a few materials were purchased staying in the $10 budget.

- Cardboard box (450x450x300mm)
- PVC pipe
- Spray paint $2.99
- Straws $1.99
- Match Sticks $2.99
- Green Straw $0.99
- PVC glue

Management:
People – Students will learn to work cooperatively in a group environment with equal roles and input.
Resources – Resources used for the design will be recycled from the home, office, community and school.
Opportunities – Students will have sufficient time to investigate, ideate, product and evaluate their water solution.
Constraints – Students will complete their water solution in the time appointed, using resources to the value of $10 or less, while remaining in the dimension requirements.
A Book for the Visually Impaired - Kellie Ellison & Kim Kouimanis

Design Challenge: A book for Visually Impaired Children
You have discovered that your local library is lacking in books for visually impaired children. As visually impaired children rely more upon their sense of touch, taste, smell and sound, your challenge is to design a book that incorporates at least two of these senses. Your only constraints are that the book must cost no more than $10 to make and it must not exceed 45cm x 45cm x 30cm. Remember to be creative and have fun!

Outcomes, Levels and Strands:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Systems
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities
Investigation: Students use the internet, the school library and the local library to research available resources for visually impaired children. Students will collaboratively discuss design ideas for the book. Students will visit a centre for visually impaired children to observe their learning in order to understand their needs in relation to the design challenge. Students will keep a journal of their observations to assist in the creation of their design. Students will also participate in a blindfolded activity to gain further understanding of using senses other than sight.
Ideation: Students use the information gathered in their journals and consider materials needed for their design. Thought should be given to the learning from the blindfold activity when considering appropriate materials. Students brainstorm possible storylines for their design. Students discuss the type of book to be made with regard to the use of two senses and how it can be put together. Students formulate drafts, using sketches to assist in producing their best design. Students consider substitute materials in order to conform to the cost restraint.
Production: Students divide the workload so that each member of the group participates. Students complete their component of the book then regroup to put together. Students follow a production plan for their design and modify as the need arises.
Evaluation: Students will present their final product to the class. They will give a short oral presentation on the processes used to complete this challenge and any modifications made. Students will seek peer assessment about their design, as well as a self assessment checklist. A representative from a local visually impaired centre will be invited to offer professional assessment as to suitability of the design as a resource, or if further modifications are required.

Cross-Curricular Links:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activities</th>
<th>Strand, level and outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Students calculate costs within budget.</td>
<td>N 3.2, S 3.1</td>
</tr>
<tr>
<td></td>
<td>Students choose 3D and create 2D illustrations.</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Students give an oral presentation.</td>
<td>Cu 3.1, Cu 3.3, Op 3.3</td>
</tr>
<tr>
<td></td>
<td>Students keep a journal of all research and observations.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students select a topic for their book and develop a story that is relevant.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students record story on CD</td>
<td></td>
</tr>
<tr>
<td>SOSE</td>
<td>Students attend an excursion to a centre for visually impaired children</td>
<td>CI D3.6, TCC 3.1</td>
</tr>
<tr>
<td></td>
<td>Students investigate the innovations in resources for the visually impaired</td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td>Students make a record their story and add various sound effects</td>
<td>ME 3.1, ME 3.2, VA 3.1, VA 3.2</td>
</tr>
<tr>
<td></td>
<td>Students draw and paint pictures that correlate with the written story</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students cut out objects from various materials to display throughout the</td>
<td></td>
</tr>
<tr>
<td></td>
<td>design</td>
<td></td>
</tr>
<tr>
<td>HPE</td>
<td>Students participate in a blind folding activity to demonstrate the</td>
<td>D3.5</td>
</tr>
<tr>
<td></td>
<td>challenges faced by people with disabilities</td>
<td></td>
</tr>
</tbody>
</table>

Assessment:
Observation: Continually observing students are on task and understand what is expected of them. Awareness of students who have difficulty in completing aspects of the task. Checklists are used to ensure learning outcomes are being met. Notes are made during oral presentation for consultation.
Consultation: Provide feedback where possible. Ask questions as to the thought process behind ideas.
Focused Analysis: Check journals and work samples to provide evidence of students learning outcomes. Oral presentation will provide further evidence.
| Peer assessment: | Students peers will be asked to complete a questionnaire in relation to the design. |
| Self Assessment: | Students will be asked to complete a self evaluation form about the design challenge, allowing the teacher to take account of the students’ perceptions. |
| Summative Assessment: | The final product will be assessed by a professional who works with visually impaired children, as to its suitability. |

**Context:**

- **Personal:** Individual and group work allow the students to formulate and discuss ideas and concepts which leads to more critical thinking through decision making and problem solving.
- **School:** Students will work with the teacher, fellow students, and various school staff.
- **Leisure and Recreation:** Students learn to appreciate the varying ways their design can be used for this purpose.
- **Community:** Students can share their design with community organizations that deal with visually impaired children. This also fosters closer community ties between individual students, their school and the wider community.
- **Industry:** Students gain knowledge of the complexities involved in the production of a product and the time it takes to achieve.

**Appropriateness:**

- **Functional:** The completed design needs to be easy to use and safe for children. The recording should be clear.
- **Aesthetic:** The completed design should be appealing to touch and sound as well as visually appealing for non impaired readers. The story should be age appropriate.
- **Social and Cultural:** The completed design should be appropriate for use within varying cultural groups.
- **Environmental:** The completed design used recycled materials and natural products, were possible.
- **Economic:** The completed design fell within budget, however larger designs of a similar nature could prove costly.

**Resources:**

- **Budget:** $10.00
- **Materials – Bought:** 4 binder rings @0.58(x4), 1 starfish @$3.95, 1 piece of sandpaper @0.47, 2 novelty items @0.49(x2)
- **TOTAL:** $7.72
- **Materials – Recycled/Pre-owned:** paper, cardboard, water paints, feathers, shells, sponge, garbage bag, laminate pouches, super glue, compact disc, compact disc sleeve
- **Tools Used:** ruler, scissors, pencil, stanley knife, cutting board, laminator, hole punch, compact disc recorder, computer

**Management:**

- **Managing People:** Students use a combination of individual research followed by small group work to complete this design challenge. Students will be made aware of safety procedures.
- **Managing Resources:** Students may access materials from school, home or wider community. They will be encouraged to use materials from the environment where appropriate.
- **Managing Opportunities:** Students will all have equal access to materials and resources to complete this challenge. All students will be given adequate time for completion and the teacher will be available for consultation if required, so that no student is disadvantaged in any way.
- **Managing Constraints:** As stated previously, the constraints consist of size and budget. Students will need to plan accordingly.
**The Suburban School Chook Pen - Lisa Janson and Ebony Cooke**

**Design Challenge: The Suburban School Chook Pen**
Chocolate, Sundae, Cookie, Sprinkles & Soufflé have grown up and now they need somewhere to live!! They are way too big for the classroom fish tank and they need a bigger space to call home. An area has been designated in the school grounds for their new residence to be built but we need your help to design it. As you have been the primary carers of the “Desserts Family” the school feels you would have the most expertise regarding this matter. It is requested that you are as creative as possible in your design, although you will need to keep within the budget and the allocated boundaries set by the school board.

**Outcomes, Levels and Strands:**

**Core learning outcomes**

**Technology Practice** -
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

**Information** -
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.

**Materials** -
MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

**Systems** -
SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems.

**Activities:**

**Investigation:** is carried out to gather knowledge, ideas and data for use in meeting design challenges.
- In groups of 4 students are requested to gather together at the site (designated by the school board) to gather data and information about requirements and suitability for their future design challenge.
- Students are encouraged to organize a conference with the School Groundsmen to assist in identifying advantages and disadvantages of the site.
- Students will research information regarding the housing of chickens from a variety of sources (eg. Internet, Library, Local Council, Poultry Farmers).
- In their groups of 4 students “Brainstorm” ideas for the upcoming project (eg. Concept maps).
- All information gathered is to be recorded in a collective “Working Journal”

**Ideation:** is undertaken to generate and communicate ideas that meet design challenges, and to justify the selection of these ideas.
- Discuss the implications of the choice of model for selection (eg. Aesthetically pleasing, structurally sound, functionality)
- Students select the most functionally appropriate design and produce a building plan to scale keeping within the set parameters/constraints.

**Production:** procedures can be identified, described and managed when making products that meet design challenges.
- Students allocate/take on roles to ensure the production of the model runs effectively.
- Students work together in groups of 4 to discuss the methods in which the chosen model is to be constructed. Students must agree on materials and tools needed to complete their project. (eg. Checklist)
- Students collaboratively create their chosen design for display/presentation.
- Students must present a 10min presentation on their product. (eg. Oral)

**Evaluation:** is undertaken to make judgments about the appropriateness of design ideas, processes and products when meeting design challenges.
- Using the set criteria students will evaluate each group’s product by ensuring they meet all the required guidelines.
- Products will then be displayed in the school library for a secret ballot in the decision of the overall winning design.

**Cross-Curricular Learnings:**

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strands and Outcomes</th>
</tr>
</thead>
</table>
| English | “Working Journals” (Collaborative) | Speaking and Listening  
Cr 4.1 - When speaking, students: Construct representations, taking account of the likely characteristics of target audience. Appeal to certain groups by selecting particular subject matter and related resources, including participants, processes, gestures and voice.  
When listening, students: Identify how characteristics of target audiences have influenced the selection of subject matter and the related resources, including participants, processes, gestures and voice, used to.  
Writing and Shaping  
Cu 4.3 - When writing and shaping, students: select subject matter according to purpose, text type, audience and medium Organise and link ideas using generic structure, paragraphs, topic sentences and theme position elaborate ideas and support a position through dependent and independent |
Mathematics  
Consider measurements when constructing the model to scale  
M 4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.

SOSE  
Identifying and gathering data on area for construction  
PS 4.3 Students participate in a field study to recommend the most effective ways to care for a place.

Science  
Consider the usefulness and environmental impacts of different materials  
LLA 4.3 Students make generalisations about the types of interaction which take place between the living and non-living parts of the environment.  
NM - 4.3 Students examine and assess ways that materials can be changed to make them more useful.  
PH 4.1 Students recommend actions they can take to promote their health in response to social, biological or environmental factors.  
PH 4.3 Students propose ways of responding to situations and behaviours that are unsafe, harmful or risky, after assessing options and consequences.

HPE  
Ensuring the safety and wellbeing of others and situations  
PH 4.1 Students recommend actions they can take to promote their health in response to social, biological or environmental factors.  
PH 4.3 Students propose ways of responding to situations and behaviours that are unsafe, harmful or risky, after assessing options and consequences.

The Arts  
Construct models for display  
VA 4.1 Students deconstruct and reconstruct images and objects to manipulate meaning through explorations of elements and additional concepts.  
VA 4.2 Students make and display images and objects, considering purposes and audiences.

Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Source of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Teacher observations of group dynamics and the processes in which they complete set tasks from within their groups.</td>
</tr>
<tr>
<td>Consultation</td>
<td>Evidence of group participation via collaborative &quot;Working Journal&quot; (Eg. Letters to community, conferences etc).</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Groups Persuasive and Oral Presentations.</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>Checklists constructed by students prior to commencement of the design challenge.</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>Design challenge matrix and final completed products.</td>
</tr>
</tbody>
</table>

Context:
Students become aware of the way in which technology affects their everyday lives. Through community research students identify the importance of a functional design and learn how to work collaboratively with peers, teachers and the local community.

Appropriateness:
Functional – Product is designed to set parameters and is appropriate in design  
Economic – Model has met the $10.00 budget  
Environmental – All considerations have been measured when accounting for environmental impacts

Resources:
The materials and tools that could be utilized by the students are only bound by that of a student’s creative mind (glue, paint, cardboard, paper, paddle pop sticks, tape, boxes, wire, felt pens, pins, foil, etc). It is suggested that students construct their models using materials found at school, their homes and from the environment and that any extra materials purchased does not exceed a budget of $10.00.

Management:
Managing people
- Students will learn to work collaboratively and collectively as a group.  
- Students will design a fair and appropriate technique of listening effectively to the individual contributions of their group.  
- Students will co-operate and provide equal opportunities for all members of their group.  
- All students will complete any individual requirements of their groups design challenge.  
- All safety precautions must be adhered to throughout the construction of the design challenge.  

Managing resources
- All students will have equal access to supplies and tools from within the classroom during the times allocated for the construction of the design challenge.  
- Students will make conscience decisions to minimize wastage through careful planning of their design.  
- Students carefully select appropriate materials to ensure they create a quality product.  

Managing opportunities
- Students will display their final product in the school library. Students will then be given the opportunity to vote for their favourite design via a secret ballot. They are encouraged to be creative, imaginative, resourceful and well researched to provide a model that would be realistic for the school to apply.  
- All students who complete their design challenge will be encouraged to utilize all avenues presented to them.  

Managing constraints
- Students are allocated a time frame of eight weeks in which they must complete the design challenge.  
- A program will be put in place to ensure students complete certain tasks each week.  
- All groups must limit their presentations to 15mins in week eight.  
- All models must follow set measurements (eg. W40cmxL40cmxH30cm).  
- All groups must adhere to the budget of $10.00.
Rubbish Receptacle - Robyn Nicholls, Joanne Pascoe and Colleen Ringland

Design Challenge: Rubbish Receptacle
The Northern Territory’s Department of National Parks and Wildlife have identified the growing problem of litter at popular tourist sites such as Uluru and Kakadu National Parks. Although adequate rubbish receptacles are provided, the amount of litter is increasing. To provide a solution to this problem, you are to design a portable rubbish receptacle that can be provided to tourists for disposal of their personal rubbish. Within a budget constraint of $10 or less, you are to produce a working model measuring no more than 450mm x 450mm x 300mm.

Outcomes

<table>
<thead>
<tr>
<th>Level:4</th>
<th>Level statement</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology practice</td>
<td>Students consult others when gathering information, generating design ideas and developing detailed design proposals. They make use of the practical expertise of others when following production procedures to make products. Students gather feedback to evaluate their ideas, processes and products.</td>
<td>TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges. TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals. TP 4.3 Students identify and use the practical expertise of others when following production procedures to make products for specific users. TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.</td>
</tr>
<tr>
<td>Information</td>
<td>Students analyse sources and forms of information and match them to requirements. They transform and transmit information for different audiences.</td>
<td>INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges. INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.</td>
</tr>
<tr>
<td>Materials</td>
<td>Students explain how materials are manipulated in different ways depending on their characteristics. They use practical knowledge about manipulating and processing materials to enhance their products.</td>
<td>MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated. MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.</td>
</tr>
<tr>
<td>Systems</td>
<td>Students identify and explain the logic of systems and subsystems. They refine and modify systems and/or subsystems, based on feedback gathered.</td>
<td>SYS 4.1 Students identify and explain the logic of systems and subsystems. SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems.</td>
</tr>
</tbody>
</table>

Activities

Investigation: (gathering knowledge, ideas and data to meet design challenges). Students will gather information and knowledge about litter problems in national parks. They will examine and analyse the impact of rubbish on the environment. Students will investigate environmental conditions and cultural sensitivities of the indigenous communities. Students will research and explore biodegradability of various materials. Students will gather information about different rubbish receptacles.

Ideation: (generating and communicating ideas that meet design challenges). Students will work in groups of 4-5 to brainstorm and discuss ideas about the rubbish receptacle. They will use a concept map to generate the group’s ideas to meet the design challenge. Sketch drawings will assist in providing a visual representation including details and definitive aspects of how this would become a working model. While devising their model, students will make notes of what materials will be needed, keeping in mind the budget of $10. Students will also have to identify the safety aspects and precautions of the chosen resources.

Production: (making products to meet design challenges). Students work collaboratively to identify steps and procedures in the production process. Students assign set tasks for each member of the group to ensure equal contribution. With safety measures in place, resources are gathered and students commence construction of their working model.

Evaluation: (judging the appropriateness of design ideas, processes and products when meeting design challenges). Students present their model visually through a PowerPoint presentation, poster advertisement and completed working model. Details including research, ideas, challenges, and positive/negative implications will be shown through a production time-line, product storyboard and a reflective journal. Students will participate in a gallery walk upon the completion of the design challenge.

Teaching strategies
Teaching strategies utilised for this design challenge include: concept map, collaborative work, storyboard, and gallery walk.

Crosscurricular learnings
Numeracy: Students estimate, count, collect, weigh, collate, graph, map and critique technological data and statistics. Visualise and construct 3-dimensional structures from 2-dimensional plans.

Literacy: Students interpret, critically appraise, and communicate information in different forms, including design briefs, instructions, plans, diagrams, illustrations, sketches. They use electronic and print media to locate, interpret and store information. They express ideas in written, spoken and visual forms. They read, listen to and exchange information.

Life skills: Students can develop personal-development, social and self-management skills.

Reflective and self-directed learner: Students can learn to critically evaluate, and reflect on, their ideas, assumptions, values, processes and products.
Level: 4

KLA | Strand | Outcomes
---|---|---
English | Speaking & Listening | Cu 4.1, Op 4.1, Cr 4.1
     | Reading & Viewing    | Cu 4.2, Op 4.2, Cr 4.2
     | Writing & Shaping    | Cu 4.3, Op 4.3, Cr 4.3
Maths | Number               | N4.1, N4.2, N3
     | Measurement          | M4.2
     | Chance and Data      | CD4.1, CD4.2
     | Space                | S4.1, S4.2
The Arts | Media               | ME 4.1, ME 4.2, ME 4.3, DME 4.4
      | Visual Arts          | VA 4.1, VA 4.2, VA 4.3
SOSE | Time, Continuity and Change | TCC 4.4
     | Place and Space      | PS 4.3, PS 4.4
Science | Natural & Processed Materials | 4.3, D4.4
HPE | Promoting the Health of Individual Communities | 4.1, 4.5
     | Enhancing Personal Development | 4.2, 4.4

Assessment ideas

<table>
<thead>
<tr>
<th>Assessment technique</th>
<th>Record</th>
<th>Anticipated evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Checklists, Anecdotal Records, Photographic records, Reflective Journal</td>
<td>Individual input, teamwork, group reflections, group progression</td>
</tr>
<tr>
<td>Consultation</td>
<td>Anecdotal Records, Checklists, Discussion</td>
<td>Group discussions, teacher consultation</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Concept maps, Sketches, Group presentation, Written task.</td>
<td>Oral and written group work</td>
</tr>
<tr>
<td>Peer assessment</td>
<td>Criteria sheets, checklists, direct questioning</td>
<td>Group presentation and gallery walk</td>
</tr>
<tr>
<td>Self assessment</td>
<td>Reflective journal</td>
<td>Personal reflections</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>Design Challenge Criteria Sheet</td>
<td>Presentation and completed product</td>
</tr>
</tbody>
</table>

Context

Leisure and recreation: Students develop awareness of social and environmental responsibilities while participating in leisure and recreation activities such as visiting national parks.

Personal: Students realise the implications of human impact on the environment.

School: Students become more aware of the school environment in regards to effects of litter.

Community: Students become aware that different communities have varying cultures with alternate views.

Industry: Students look at how goods are produced and how production considerations and requirements are met.

Appropriateness

Aesthetic: Is the design aesthetically pleasing?

Cultural: Is the model culturally sensitive and appropriate? Are there cultural considerations regarding the use of artwork?

Economic: Did the project come under budget?

Functional: Are the materials biodegradable? Does the product meet its intended purpose?

Resources

<table>
<thead>
<tr>
<th>General Materials</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>paint</td>
<td>scissors</td>
</tr>
<tr>
<td>assorted materials – natural and synthetic</td>
<td>brushes</td>
</tr>
<tr>
<td>plastic</td>
<td>cutters/cutting mats</td>
</tr>
<tr>
<td>Thread/string</td>
<td>rulers/measuring tapes</td>
</tr>
<tr>
<td>craft glue/adhesive tape</td>
<td>sewing machine</td>
</tr>
<tr>
<td>paper/cardboard</td>
<td>pencil</td>
</tr>
</tbody>
</table>

Management:

Managing people

In groups of 4 students allocate tasks to each member. Each workstation will be allocated an area of the room which includes adequate floor space, materials and supervision.

Managing resources

Classroom resources will be made available during the allocated time. Storage room will be provided for design challenges. Tools and construction will be under teacher supervision at all times.

Managing opportunities

Students will have the opportunity to present their model during group presentation time and the gallery walk.

Managing constraints

All work on the design challenge must be met by the budget, size and time constraints. The design challenges must be completed in allocated class time and must be the students own work.
Design Challenge - The Hybrid Animal Species

It is the year 2134. The human race has had an unbelievably detrimental affect on the environment. This has forced animals to adapt to environments which are different to those which they are used to. The Minister for The Animal Protection Corporation has asked you to design a hybrid animal - one which encompasses various adaptations to suit almost any environment. (Think wings, flippers and claws for example) You have been given a budget of $10 and a design constraint of 450mm x 450mm x 300mm for the environment area. You are now the Chief Animal Designer...so get to work!

Outcomes, Levels and Strands:

Technology practice
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.

Materials
MAT 4.2 Students employ their own and others' practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Activities:

Investigation
- Students examined and discussed the Design Challenge Criteria
- Decided on a Design Challenge idea
- Planned and made detailed outlines of the design of the task.
- Discussed a possible feature that could be considered a ‘working’ part of the design
- Researched resources and materials required
- Outlined positives and negatives of the ideas that were being formed
- Discussed budget, time constraints, ethical issues, responsibilities and job descriptions

Ideation
- Re-read criteria and summary pages
- Re-planned design layout and refined
- Planned meeting times and consulted
- Discussed where the animal would be placed with the design and what features it would have
- Discussed budget and purchased items required
- Gathered resources and found appropriate sized box for challenge
- Refined ideas and decided on final plan for construction of model

Production
- Started to construct design model
- Ensured that all elements were being implemented and accounted for
- Assembled box and layout features
- Attached the designed animal and ensured part was working
- Consulted with other group members to ensure input was shared and fair
- Checked the aesthetical design and made any necessary alterations
- Completed building of the Design Challenge model

Evaluation
- Discussed any possible changes that could be made to enhance the Design Challenge
- Consulted with group members to ensure that all members agreed that the design was completed to high standard
- Tested flying animal to ensure that the working part was credible and was efficient
- Compared all aspects of the design to those specified in the criteria sheet

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>OUTCOME</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Arts</td>
<td>ME 4.1 Students apply media languages and</td>
<td>Students create advertising regarding their animal.</td>
</tr>
<tr>
<td></td>
<td>technologies through genre conventions to</td>
<td>Students create posters for a specific audience.</td>
</tr>
<tr>
<td></td>
<td>construct media texts.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VA 4.2 Students make and display images and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>objects, considering purposes and audiences.</td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>SS 4.3 Students present analyses of the short-</td>
<td>Students discuss the effect of science on the</td>
</tr>
<tr>
<td></td>
<td>and long-term effects of some of the ways in</td>
<td>environment</td>
</tr>
<tr>
<td></td>
<td>which science is used.</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>M 4.1 Students choose appropriate units when</td>
<td>Students measure box size, as well as materials</td>
</tr>
<tr>
<td></td>
<td>estimating and measuring and explain</td>
<td>for construction</td>
</tr>
<tr>
<td></td>
<td>relationships between dimensions when</td>
<td></td>
</tr>
<tr>
<td></td>
<td>investigating areas, volumes of prisms and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>lengths of boundaries of rectangles.</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Cr 4.3 When writing and shaping, students:</td>
<td>Students create a narrative about their animal</td>
</tr>
<tr>
<td></td>
<td>Choose aspects of subject matter, attributes,</td>
<td>and environment with a focus on appealing to a</td>
</tr>
<tr>
<td></td>
<td>processes and visual resources to construct</td>
<td>specific group.</td>
</tr>
<tr>
<td></td>
<td>representations of people, places, events and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>things in ways that appeal to certain</td>
<td></td>
</tr>
<tr>
<td>SOSE</td>
<td>TCC 4.1 Students use primary sources to</td>
<td>Students discuss environmental change and predict</td>
</tr>
<tr>
<td></td>
<td>investigate situations before and after a</td>
<td>future change in the environment.</td>
</tr>
<tr>
<td></td>
<td>change in Australian or global settings.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PS 4.2 Students predict the impact of changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>on environments by comparing evidence.</td>
<td></td>
</tr>
<tr>
<td>HPE</td>
<td>PHIC 4.5 Students identify aspects of their</td>
<td>Students discuss the effect that a new environment,</td>
</tr>
<tr>
<td></td>
<td>social and physical environments that</td>
<td>or lack of environment will impact.</td>
</tr>
<tr>
<td></td>
<td>enhance, or pose threats to.</td>
<td></td>
</tr>
</tbody>
</table>
their health, and plan strategies for achieving healthy environments for themselves and others.

on their lives, not just on animal life.

Assessment Ideas

- **Presentations** – Students present their findings and the finished design challenge to the class through presentations.
- **Observations** – Students observe a display of the Design Challenges through a series of gallery walks and take notes on the benefits and consequences of each Design.
- **Folio of Data** – Each student will collect data of their contributions to their group throughout the design challenge and any results they find through research. Include Poster and Narrative assessment from Crosscurricular Learning.
- **Journals** – Students will keep a diary or journal of the process of events that they went through for the entire process of the Challenge including diagrams, pictures, notes and ideas.

Context:

**Agricultural**: Students identify what sorts of environments a new species would need to be able to adapt to and what impact this animal could have on the land. Identify if this animal will have negative impacts on agricultural areas and what can be done to prevent negative outcomes.

**Global**: Students discuss the impacts both positive and negative a new species will have on a global scale. Will this animal create issues for different countries, why or why not? Economically, what are the benefits and consequences of investing in a new species of animal?

**Communities**: Students identify if this animal can be integrated within a community. Will the animal be able to live in a community and what communities could benefit most from having this animal living there?

**Industry**: By creating a new species for environmental purposes, will this animal assist or hinder the industry sector of a country? What can be done to improve the living environment for this animal and how can humans adjust by having this animal available.

**Appropriateness**:

- **Aesthetic**: Students consider aspects such as colour, texture and layout.
- **Environmental**: Students considered impacts both negative and positive on the environment and also on society.
- **Social**: Students are aware that the product is shaped by the needs of society.

**Resources**:

- **Flying Pig**: $9.95
- **Accessories**: All other materials used were available to us with no cost involved. These included: feathers, cardboard, glue, masking tape, raffia, toilet rolls, fur material, goggle eyes, cellophane.

**Management**:

- **People**: The group worked collaboratively as a team and provided support for each other when designing and constructing the model. The students used interpersonal skills and interacted on one to one basis, partnerships and whole group. Students maintained respect for each other’s ideas, space and concerns. Students ensured that while working within the group, each individual was contributing equally to the design challenge and extended their personal capabilities. Safety aspects were maintained and all risks were assessed.

- **Resources**: Students planned in advance the resources that would be required to complete the design model. Students took into consideration the budget constraint and then decided on the best course of action to obtain the rest of the materials. Students ensured that resources were not wasted and that anything that could be recycled was kept for future purposes.

- **Opportunities**: Students discussed at length the design challenge criteria’s and the possible avenues that could be taken to complete the challenge successfully. Each individual presented ideas, issues, concerns and support for the design and then a layout was composed for the decided concept. Through working collaboratively, the students could then offer all possible resources and creativity input that was possible and pool together these ideas to find the best way to accomplish the task. Students used problem – solving skills, negotiation, flexibility, creativity and organization to design the model.

- **Constraints**:
  - **Time**: Students became aware of the time constraints through the criteria and then planned the design upon this timetable. Students gave themselves a deadline and decided to have the task completed by this time in the most efficient and effective way they could.
  - **Budget**: The budget for the Design Challenge was a maximum of $10.00.
  - **Audience Needs and Requirements**: Students decided that the most effective concept of the design created was that many communities could benefit, both on a local and a global scale. They considered such elements as environment, financial burdens, ethical and cultural desires and the products benefits and consequences.
Building in Flooding Areas - Kathy-Lee Peers and Rebecca Taylor

Design Challenge: Building in Flooding Areas
Due to the growing population of the Gold Coast, we have been forced to build houses in areas which flood easily. The Gold Coast City Council needs your help in designing a house that will be suitable for these areas. You and your partner are to present your model which is to be no larger than 450mm x 450mm x 300mm to the board of directors in 5 weeks time. Be sure to keep your budget under $10!

Outcomes, Levels and Strands:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.

Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Information
INF 3.1 Students describe advantages and disadvantages of different sources and forms of information.

Activities:
Investigation: TP 3.1, MAT 3.1, INF 3.1:
- Students investigate the current structures of houses in flooded areas and most suitable materials. This is completed in ‘expert groups’ followed by a class discussion.

Ideation: TP 3.2, MAT 3.2:
- Students brainstorm the design aspects of their own home that they like/dislike. This will be completed using the ‘think, pair, share’ teaching strategy.
- Students will create sketches of their design ideas considering scale, detailing selected materials and design aspects. They will select their best design according to the level of appropriateness (using the 7 stages of appropriateness).

Production: TP 3.3:
- Students will use the selected materials to build their model, ensuring they follow their final selected sketches.

Evaluation: TP 3.4:
- Students will test the suitability of the model and make any adjustments where necessary.
- Students participate in a Gallery Walk, evaluating their peers’ designs and answering the questions related to appropriateness.
- Students will evaluate their design making use of PowerPoint and video technology as evidence of the testing process. Evaluation will include where students believe they went well, need to improve and what they would alter if given the same opportunity again.

Cross-curricular Learning:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand and Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOSE PS</td>
<td>PS 3.4 Students use and make maps to identify coastal and land features, countries and continents, and climate zones.</td>
<td>Students create a map identifying the coastal features of the designated flooding area. They are to include a scale indicating the average level of rainfall per year.</td>
</tr>
<tr>
<td>Visual Art VA 3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings</td>
<td>Students will sketch and then create their design plans using computer technology. They will have to maintain a portfolio which presents any modifications they made to their plan, as well as short descriptions explaining what and why they altered sections of their design.</td>
<td></td>
</tr>
<tr>
<td>Mathematics S 3.1 Students describe the defining geometric properties of families of 3D shapes, model 3D shapes using nets and other representations, and identify and describe the properties of specific families and subgroups of 2D shapes. S 3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids.</td>
<td>Students examine the properties and features of 3D objects using nets for use in their final model. Students create plans of a house using a scale, taking into consideration the location and including a compass.</td>
<td></td>
</tr>
<tr>
<td>Science SS 3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects. EC 3.3 Students identify different ways of obtaining energy.</td>
<td>Students make predictions about the impact of their model on the community and the environment. During the ideation stage, students especially consider their model’s effects on pollution and health. Students consider the need for solar energy and heating within their design model.</td>
<td></td>
</tr>
<tr>
<td>English Op 3.1 Students identify different ways of obtaining energy.</td>
<td>Students present a speech to a ‘board of directors’. It should explain the design process and reasoning behind selected materials and features of their model.</td>
<td></td>
</tr>
<tr>
<td>ICT DCP 4.2 Students create digital communication and publishing products for a particular audience within an identified genre convention and justify their use of design elements and principles.</td>
<td>Students collect video evidence of the test of their final design. Students create and present a PowerPoint presentation to a ‘board of directors’ justifying their use of design elements, including the video evidence.</td>
<td></td>
</tr>
</tbody>
</table>
Assessment Ideas:
1. Through observation, students will be assessed on their participation in expert groups and the appropriateness of their findings.
2. Using a rubric, the quality and accuracy of the students’ sketches and selected materials will be assessed.
3. Using a checklist, the students’ final model will be assessed according to how well it adhered to the constraints.
4. A peer assessment form, detailing the appropriateness, will be completed when completing the Gallery Walk.
5. Using a criteria sheet, students’ final assessment will be in the form of a presentation, including use of technology such as PowerPoint and video.

Context:
- Global
- Home and family
- Survival
- Communities

 Appropriateness:
- Environmental appropriateness: the design must take into consideration the surrounding wildlife and make use of appropriate materials and structure.
- Aesthetic appropriateness: the design must be visually appealing to the general public.
- Economic appropriateness: the design should be affordable for a middle socio-economic community.
- Functional appropriateness: the design must provide resources in order for people to survive during flooding periods.

Resources:
Where possible, resources should be utilized from recycled materials found around the home. The total of any bought resources must not exceed $10. Some resource ideas are below; however, this is not an exhaustive list.

<table>
<thead>
<tr>
<th>Recycled</th>
<th>Purchased</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polystyrene</td>
<td>Fake plant</td>
</tr>
<tr>
<td>Shoe box</td>
<td>Paint</td>
</tr>
<tr>
<td>Egg cartons</td>
<td>Spray paint</td>
</tr>
<tr>
<td>Buttons</td>
<td>Fabric</td>
</tr>
<tr>
<td></td>
<td>Paddle pop sticks</td>
</tr>
<tr>
<td></td>
<td>Toothpicks</td>
</tr>
<tr>
<td></td>
<td>Cotton wool</td>
</tr>
<tr>
<td></td>
<td>Fabric</td>
</tr>
<tr>
<td></td>
<td>Film canisters</td>
</tr>
</tbody>
</table>

Total Spent: $6.56

Management:
Managing people
- Students develop the ability to cooperate effectively within small group and paired scenarios. This is achieved through teaching strategies known as ‘expert groups’ and ‘think, pair, share’ discussions.
- Safety precautions will be applied when constructing their design challenge through risk assessment and adult supervision.

Managing resources
- Students are to bring resources from around the house or which can easily be found at no cost. Any purchased materials can not exceed the budget of $10.
- If any sharp tools such as a Stanley knife are required for the development of a design challenge, students are required to ask for adult assistance.

Managing opportunities
- Equal opportunities will be provided for all students to have access to class resources.
- All students will have equal class time to research and design their model.

Managing constraints
- Students are to work in pairs when developing their model.
- The model needs to be no larger than 450mm x 450mm x 300mm
- A five week period is allocated to this design challenge, with 90 minutes class time per week.
- Any purchased items used for the design challenge must not exceed a total of $10.
You are the Co-Captains of a pirate ship. You and your crew have been shipwrecked on a deserted island. Your ship has been completely destroyed. Fortunately, the ship and the deserted island contain an abundance of resources that will assist in building a small floating device. The device must be able to float and carry 200g of weight. This is to ensure that it will be able to withhold your body weight to take you home safely and bring a ship back to rescue the rest of the crew.

Outcomes, Levels and Strands:
Technology Practice, Level 3
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information, Level 3
INF 3.2 - Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials, Level 3
MAT 3.1 - Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 - Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Systems, Level 3
SYS 3.2 - Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:
Investigation:
- Students will research by means of the Internet, books or movies, different types of floating devices to gather ideas for their challenge.
- Students will research different kinds of materials that can be used to construct their floating device.
- Students will consider what issues or problems they may encounter through their design challenge.

Ideation:
- In their pairs, students will brainstorm ideas for their design.
- In their pairs, students will discuss their ideas and develop a concept map of the ideas for their design challenge.

Production:
- In their pairs, students will assign roles for the production process.
- Students will explore any problems in the production and find resolutions.
- Students will construct the final product of their design challenge, meeting all constraints related to the challenge.

Evaluation:
- Students will make judgments about the appropriateness of their final design process and products.
- Students will experiment the success of their final product.
- Students will reflect on the possible consequences of their design.
- In journals, students will reflect on: how the design challenge unfolded including issues and problems that occurred and how they were resolved, their individual contribution, group interaction and management skills.

Cross-curricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcomes</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science</td>
<td>• Natural and Processed Materials, level 4</td>
<td>Investigate and experiment with different materials to discover what floats or sinks and why.</td>
</tr>
<tr>
<td></td>
<td>4.3 Students examine and assess ways that materials can be changed to make them more useful.</td>
<td>Investigate the effects that different weather conditions may have on your raft.</td>
</tr>
<tr>
<td></td>
<td>• Earth and Beyond, level 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>4.1 Students recognise and analyse some interactions (incl. the weather) between systems of Earth and beyond.</td>
<td></td>
</tr>
<tr>
<td>The Arts</td>
<td>• Visual Arts, level 3</td>
<td>Design and decorate floating device with available resources.</td>
</tr>
<tr>
<td></td>
<td>VA 3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings.</td>
<td>In groups, students discuss scenarios of what happened before and after the shipwreck and create a role-play to dramatise the event.</td>
</tr>
<tr>
<td></td>
<td>• Drama, level 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DR 3.1 Students negotiate, in and out of role, a range of situations and narratives.</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>• Measurement, level 3</td>
<td>Experiment how much weight your floating device can withhold.</td>
</tr>
<tr>
<td></td>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
<td>Students test other materials for floating ability. Then create graph or table to organise data.</td>
</tr>
<tr>
<td></td>
<td>• Chance and Data, level 3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CD 3.2 Students design and trial a variety of data collection methods and use existing sources of data to investigate their own and others’ questions, organise data and create suitable displays, identifying and interpreting elements of the displays.</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>• Writing and Shaping, level 3</td>
<td>Write a journal entry about the events of the shipwreck.</td>
</tr>
<tr>
<td></td>
<td>CR 3.3 When writing and shaping, students choose aspects of subject matter and particular attributes, processes and visual resources to construct positive or negative representations of people, places, events and things.</td>
<td></td>
</tr>
</tbody>
</table>
### Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Focus on anecdotal records of children’s behaviours and attitudes towards the design challenge and their group members, checklists to ensure ideation, investigation, production and evaluation.</td>
</tr>
<tr>
<td>Focused analysis</td>
<td>Focus on the oral presentation of the design challenge (in PowerPoint format). The student’s presentation will be video recorded by the teacher. Students will be assessed on their presentation and the final design product against an assessment rubric. Students will also hand in their Technology project folios that have been compiled through the design challenge. This working portfolio will display a collection of the students’ work, and may include journal entries, notes, sketches, drawings, designs, plans, multimedia, presentations, models or products. Focus on student’s evaluations and reflection of the design process and group participation. Peer and self-assessment sheets will be used to do so. Teachers will find other evidence in the journal entries included in the student’s Technology project folio.</td>
</tr>
<tr>
<td>Self and peer assessment</td>
<td>Focus on the oral presentation of the design challenge (in PowerPoint format). The student’s presentation will be video recorded by the teacher. Students will be assessed on their presentation and the final design product against an assessment rubric. Students will also hand in their Technology project folios that have been compiled through the design challenge. This working portfolio will display a collection of the students’ work, and may include journal entries, notes, sketches, drawings, designs, plans, multimedia, presentations, models or products. Focus on student’s evaluations and reflection of the design process and group participation. Peer and self-assessment sheets will be used to do so. Teachers will find other evidence in the journal entries included in the student’s Technology project folio.</td>
</tr>
</tbody>
</table>

**Context:**

**School:** Students will work in their pair to accomplish a common goal. This will be carried out within the time constraints established by the classroom teacher.

**Home and Family:** Students will obtain materials from home that will assist in building their floating device. Students may also continue (or advance) their research and design ideas while at home, outside the hours of school.

**Personal:** Students will research, design and create a floating device to meet their personal objective. As they work in pairs, they will also develop a number of skills, such as, communication and co-operation skills.

** Appropriateness:**

**Economic:** The floating device must be completed within a budget; no more than $10.00 and a record of the costs are to be kept.

**Environmental:** Students are encouraged to create their design from environmentally friendly and recycled materials. The product is to simply be a floating device that will hinder the use of fuel.

**Functional:** The working product must float and be able to withhold the weight of 2 plasticeen pirate figures (200g).

**Social:** The design challenge will be completed in pairs and will call for co-operation and group interaction skills. Group members will also have to assign roles for the production process of the floating device.

**Resources:**

**Compulsory:**
- Construction materials, i.e. Scissors, glue, sketch paper, pencil, eraser.
- Materials that do not exceed the $10 budget
- Environmentally friendly materials, such as sticks, twigs, leaves, bark, Bamboo sticks
- Recycled materials like, twine/string, off cuts of wood, mesh, paddle pop sticks

**Optional:**

**Management:**

**Managing people**
- Students will manage their groups, assigning specific roles with regards to individual and group activities. Teachers should ensure all students are aware of risk, health and safety issues that may occur through the production process and make clear the consequences of unsafe behaviour.

**Managing resource**
- Students will organise a list of materials/resources that are required for their design challenge. Selection should be based on the availability and the cost of the materials, keeping in mind the budget.

**Managing opportunities**
- Students must be given the same treatment and access to all desirable resources (time, materials and people) to allow equal possibility of success.

**Managing constraints**
- In their pairs, students will be required to manage their time and budget constraints ($10).

*All materials used to design and create this particular floating device were all recycled or environmentally friendly, therefore there were no expenses.*
Design Challenge: Kitchen Garden
Queensland the Healthy State

The Queensland Government has put out a challenge for primary schools to promote healthy eating habits, within the school environment. Your challenge is to design a prototype of a garden, which could be further developed into a fully functional and sustainable garden.

The limitations of the challenge are that the design must be no bigger than 450mm x 450mm x 300mm, and remain within a $10 budget.

Outcomes, Levels and Strands:
Technology Practice

TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives with in design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detail design proposals.
TP 4.3 Students identify and make used of the practical expertises of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback, gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information
INF4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
INF4.2 Students apply techniques for transforming and transmitting information for different audiences.

Material
MAT 4.1 Students explain how characteristics of materials effect ways they can be manipulated.
MAT 4.2 Students employ their own and others practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their product.

System
SYS 4.1 Students identify and explain the logic of systems and sub systems.

Activities:
Investigation Students will work cooperatively, using their prior knowledge to brainstorm ideas on what a healthy diet comprises of and the foods you require to sustain that healthy eating regime. Students’ work in small groups to collect and record the data gathered. Students delegate within their groups various jobs on researching this design challenge. Students to keep a group meeting log, while recording their findings in a journal.

Ideation In meeting this design challenge students will identify and list the materials required. Students will gather the materials to create their design challenge. Students will discuss environmental issues regarding the model for example; pest control, irrigation and composting.

Production Students work collaboratively as a class to identify and plot the steps to construct their models. Within a group environment students will work technologically, taking into account all peer input regarding this challenge. Students will demonstrate why healthy food is needed to sustain healthy bodies. Students will explain to the class why organically grown fruit and vegetables are more beneficial to them and the environment. At a later date students will present their models using a variety of multimodal tools.

Evaluation As class activity students will use peer and self-evaluation, to assess the appropriateness of their designs and the processes which were involved, including the design and presentation of the models. In their journals students will evaluate and reflect on their work and presentations.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>OUTCOMES</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGLISH</td>
<td>Cr 4.3 Students choose aspects of subject matter, attributes, processes and visual resources to construct representation of people, places, events and things in ways that appeal to certain groups. Cr 4.1 Students identify how the selection of subject matter and the participants processes, gestures and voices qualities used to construct representations is influenced by likely characteristics of the listener</td>
<td>Brainstorming Mind maps Create healthy menu Oral presentation Record in a journal</td>
</tr>
<tr>
<td>Math's</td>
<td>Space S4.2 Students interpret maps and plans with reference to convention including latitude and longitude for maps and describe movements using compass points and distance Measurement M4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating area volumes of prisms and lengths of boundaries of rectangles</td>
<td>Measure the dimensions scales and sketching the model grid paper, mapping</td>
</tr>
<tr>
<td>Science</td>
<td>L&amp;L 4.1 Students examine the internal and external structure of living things (including animal respiratory systems and plant systems) and account for observed similarities and differences in terms of adaptation E&amp;B 4.1 Students recogise and analyse some interactions (including the weather)between systems of Earth and Beyond</td>
<td>Collect information on the plants the students wish to grow, how to deal with waste products and natural insecticide Research information about water.</td>
</tr>
<tr>
<td>HPE</td>
<td>P H 4.4 Students justify the selection of health products and services that best meet their health needs</td>
<td>Collect information</td>
</tr>
</tbody>
</table>
Assessment Ideas:

<table>
<thead>
<tr>
<th>Technique</th>
<th>Source of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Teacher observes students using checklist, anecdotal records participation and interaction conflict resolution contributions quick notes</td>
</tr>
<tr>
<td>Consultation</td>
<td>Progress chart consult with student on design ideas</td>
</tr>
<tr>
<td>Peer/Self Assessment</td>
<td>Students record individual reflective journals and record of group contributions</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Design proposals presented to council and class oral presentation graph</td>
</tr>
<tr>
<td>Portfolio of Work</td>
<td>Students collect work photos and record individual contributions</td>
</tr>
<tr>
<td>Assessment Rubric</td>
<td>Were design drafts detailed? Was there evidence of group planning and group problem solving? Were context appropriateness and management considered in all four stages of working technologically?</td>
</tr>
</tbody>
</table>

Context:
Agriculture - Environmental issues addressed by students.
Business – Part of the design could be developed into a small business.
Community – Students design the kitchen garden with the emphasis on health, with a future focus on the wider community.
Home and Family – Knowledge acquired can be utilised and shared with the family.
Personal – Students reflect on choices of healthy menu and environment preservation.
School – Student’s healthy approach can be incorporated into the school community.

Appropriateness:
Aesthetic - Does the design of the garden promote the healthy ideals and is it aesthetically pleasing?
Cultural- Has the garden design excluded any cultural groups?
Economic – Is the design built with recycled materials and within budget $10?
Environmental - Has the model been designed with consideration of environmental issues.
Ethical-Garden to cater for all within the school community
Functional – Does the garden match the intended purpose and requirements?
Social – Students will select a variety of fruit and vegetables that appeals to the wider school community.

Resources:
A variety of recyclable materials can be used in the construction this challenge, with the option to use school resources. Other resources may include the Internet, library, the local council, landscaping businesses and experts from the wider community.

Management:
People – Students work collaboratively within the whole class and small groups to develop communication skills during the design and construct model, all members of class to participate equally.
Resources – Student may bring their own resources but are encouraged to use the school resources available.
Opportunity – All students will be encouraged to investigate, ideate, produce and evaluate during the design challenge.
Constraints – Students will refer to criteria sheet regarding time, budget and size constraints.
A Book for Visually Impaired Children - Kellie Ellison & Kim Kouimanis

Design Challenge: A Book for Visually Impaired Children
You have discovered that your local library is lacking in books for visually impaired children. As visually impaired children rely more upon their sense of touch, taste, smell and sound, your challenge is to design a book that incorporates at least two of these senses. Your only constraints are that the book must cost no more than $10 to make and it must not exceed 45cm x 30cm. Remember to be creative and have fun!

Outcomes, Levels and Strands:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Systems
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities
Investigation: Students use the internet, the school library and the local library to research available resources for visually impaired children. Students will collaboratively discuss design ideas for the book. Students will visit a centre for visually impaired children to observe their learning in order to understand their needs in relation to the design challenge. Students will keep a journal of their observations to assist in the creation of their design. Students will also participate in a blindfolded activity to gain further understanding of using senses other than sight.
Ideation: Students use the information gathered in their journals and consider materials needed for their design. Thought should be given to the learning from the blindfold activity when considering appropriate materials. Students brainstorm possible storylines for their design. Students discuss the type of book to be made with regard to the use of two senses and how it can be put together. Students formulate drafts, using sketches to assist in producing their best design. Students consider substitute materials in order to conform to the cost restraint.
Production: Students divide the workload so that each member of the group participates. Students complete their component of the book then regroup to put together. Students follow a production plan for their design and modify as the need arises. Evaluation: Students will present their final product to the class. They will give a short oral presentation on the processes used to complete this challenge and any modifications made. Students will seek peer assessment about their design, as well as a self assessment checklist. A representative from a local visually impaired centre will be invited to offer professional assessment as to suitability of the design as a resource, or if further modifications are required.

Crosscurricular Links:

<table>
<thead>
<tr>
<th>KLA Activities</th>
<th>Strand, level and outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mathematics</strong></td>
<td>Students calculate costs within budget.</td>
</tr>
<tr>
<td></td>
<td>Students choose 3D and create 2D illustrations.</td>
</tr>
<tr>
<td><strong>English</strong></td>
<td>Students give an oral presentation.</td>
</tr>
<tr>
<td></td>
<td>Students keep a journal of all research and observations.</td>
</tr>
<tr>
<td></td>
<td>Students select a topic for their book and develop a story that is relevant.</td>
</tr>
<tr>
<td></td>
<td>Students record story on CD</td>
</tr>
<tr>
<td><strong>SOSE</strong></td>
<td>Students attend an excursion to a centre for visually impaired children</td>
</tr>
<tr>
<td></td>
<td>Students investigate the innovations in resources for the visually impaired</td>
</tr>
<tr>
<td><strong>Arts</strong></td>
<td>Students make a record their story and add various sound effects</td>
</tr>
<tr>
<td></td>
<td>Students draw and paint pictures that correlate with the written story</td>
</tr>
<tr>
<td></td>
<td>Students cut out objects from various materials to display throughout the design</td>
</tr>
<tr>
<td><strong>HPE</strong></td>
<td>Students participate in a blind folding activity to demonstrate the challenges faced by people with disabilities</td>
</tr>
</tbody>
</table>

Assessment:

| Observation: | Continually observing students are on task and understand what is expected of them. Awareness of students who have difficulty in completing aspects of the task. Checklists are used to ensure learning outcomes are being met. Notes are made during oral presentation for consultation. |
| Consultation: | Provide feedback where possible. Ask questions as to the thought process behind ideas. |
| Focused Analysis: | Check journals and work samples to provide evidence of students learning outcomes. Oral presentation will provide further evidence. |
| Peer assessment: | Students peers will be asked to complete a questionnaire in relation to the design. |
| Self Assessment: | Students will be asked to complete a self evaluation form about the design challenge, allowing
the teacher to take account of the students’ perceptions.

**Summative Assessment:** The final product will be assessed by a professional who works with visually impaired children, as to its suitability.

**Context:**
- **Personal:** Individual and group work allow the students to formulate and discuss ideas and concepts which leads to more critical thinking through decision making and problem solving.
- **School:** Students will work with the teacher, fellow students, and various school staff.
- **Leisure and Recreation:** Students learn to appreciate the varying ways their design can be used for this purpose.
- **Community:** Students can share their design with community organizations that deal with visually impaired children. This also fosters closer community ties between individual students, their school and the wider community.
- **Industry:** Students gain knowledge of the complexities involved in the production of a product and the time it takes to achieve.

** Appropriateness:**
- **Functional:** The completed design needs to be easy to use and safe for children. The recording should be clear.
- **Aesthetic:** The completed design should be appealing to touch and sound as well as visually appealing for non impaired readers. The story should be age appropriate.
- **Social and Cultural:** The completed design should be appropriate for use within varying cultural groups.
- **Environmental:** The completed design used recycled materials and natural products, were possible.
- **Economic:** The completed design fell within budget, however larger designs of a similar nature could prove costly.

**Resources:**
- **Budget:** $10.00
- **Materials – Bought:** 4 binder rings @0.58(x4), 1 starfish @$3.95, 1 piece of sandpaper @0.47, 2 novelty items @0.49(x2)
  
  **TOTAL:** $7.72
- **Materials – Recycled/Pre-owned:** paper, cardboard, water paints, feathers, shells, sponge, garbage bag, laminate pouches, super glue, compact disc, compact disc sleeve
- **Tools Used:** ruler, scissors, pencil, stanley knife, cutting board, laminator, hole punch, compact disc recorder, computer

**Management:**
- **Managing People:** Students use a combination of individual research followed by small group work to complete this design challenge. Students will be made aware of safety procedures.
- **Managing Resources:** Students may access materials from school, home or wider community. They will be encouraged to use materials from the environment where appropriate.
- **Managing Opportunities:** Students will all have equal access to materials and resources to complete this challenge. All students will be given adequate time for completion and the teacher will be available for consultation if required, so that no student is disadvantaged in any way.
- **Managing Constraints:** As stated previously, the constraints consist of size and budget. Students will need to plan accordingly.
Let The Game Show Begin! - Lisa Cassar and Matthew James Garrett

Design Challenge: Let the Game Show Begin!

Channel 9 is looking for a new children’s show to fill their prime time 3:30-4pm timeslot through the week. As this timeslot is set aside for after school programming, they want school children to not only decide on what the new show should be... but they want them to create it! Your challenge is create a viable, dynamic, engaging and entertaining children’s show of any genre. In a group of no more than four(4) you are to build a set, develop a concept and write up a proposal to accompany your design. Channel 9 has set strict guidelines for submissions. All designs must be no bigger than 450mmx450mmx300mm and cost no more in $10 to make. The best show solution will win $5000 and be made by Channel 9 as their new afternoon children’s program. The creators of the winning submission will also be the guest stars on the first episode. Good luck future superstars!

IN RESPONSE...

In response to this design challenge a game show entitled ‘THROWNDOWN’© has been created. The following discusses what activities, crosscurricular learnings, outcomes, levels and strands, and what assessment ideas could be incorporated into this design challenge. This document also discusses the resources needed, management practices required; and identifies related areas of appropriateness while selecting what contexts this solution operates.

Technology Outcome Levels And Strands:

<table>
<thead>
<tr>
<th>TECHNOLOGY PRactice</th>
<th>INVESTIGATION</th>
<th>IDEAION</th>
<th>EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP 4.1</td>
<td>Through examining students investigate current television shows, and what possible material could be used. Through analysing these areas students can begin to gather materials, concepts and discuss ideas that are to be recorded. Activities include:</td>
<td>Students work together in groups and individually to generate and communicate ideas to meet design challenge criteria. Through these ideas students can begin to discuss and plan their designs. Activities which will assists are as follows:</td>
<td>Students test and present there design challenges to the class outlining the usefulness, appropriateness and credibility of their design. Students make supportive judgments and comments for students to consider and build upon when reflecting possible solutions for their model. students compare models and choose the best design.</td>
</tr>
<tr>
<td>INF 4.1 students analyse sources and forms of information and match these to the requirements of design challenges.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 4.1 students explain how characteristics of materials affect ways they can be manipulated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MAT 4.2 students employ their own and others’ practical knowledge and techniques for manipulating and processing materials in order to enhance their products.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activities

<table>
<thead>
<tr>
<th>INVESTIGATION</th>
<th>IDEATION</th>
<th>EVALUATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigate current television shows and identify what possible materials could be used. Activities include: Get feedback from subject experts.</td>
<td>Students work together in groups and individually to generate and communicate ideas to meet design challenge criteria. Through these ideas students can begin to discuss and plan their designs. Activities which will assists are as follows:</td>
<td>Students test and present there design challenges to the class outlining the usefulness, appropriateness and credibility of their design. Students make supportive judgments and comments for students to consider and build upon when reflecting possible solutions for their model. students compare models and choose the best design.</td>
</tr>
<tr>
<td>Mind Mapping</td>
<td>Brainstorming</td>
<td>SWOT Analysis</td>
</tr>
<tr>
<td>Task Management Board</td>
<td>Diagram/ Picture Pitch</td>
<td>Role Play Pitching Scenarios</td>
</tr>
</tbody>
</table>

Crosscurricular Links

<table>
<thead>
<tr>
<th>KLA</th>
<th>OUTCOMES, LEVELS &amp; STRAND</th>
<th>ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH</td>
<td>Topic: length, mass, area and volume</td>
<td>Students need to accurately measure the dimensions of each section of the game and the pieces within. Students must also scale model by measuring and estimating components in order to keep to size specifications.</td>
</tr>
<tr>
<td>ENGLISH</td>
<td>CU 4.1, OP 4.1, CR4.1, OP4.2, CR4.2, CU4.3, OP4.3, CR4.3</td>
<td>When speaking and listening, reading and viewing and when writing and shaping:</td>
</tr>
<tr>
<td>ARRTS</td>
<td>ME 4.2 Students select media forms and apply technologies to construct and present media text to target an audience.</td>
<td>Students create and select a name and logo for their television show based on audience. Students make posters, and signage form existing images and creation of new ones</td>
</tr>
</tbody>
</table>

88
SOSE CI 4.3 Students debate how media images concerning gender, age, ethnicity and disability reflect groups to which they belong.

• Students consider and research what images and identities are seen in media.  
• Students then debate what images should present in a programme that is non-discriminatory and reflects effective social justice practice.

H.P.E PHC 4.3 students propose ways of responding to situations and behaviours that are unsafe, harmful or risky, after assessing options and consequences

DCSP 4.1 Students create and perform sequences in games, or other physical activities, implementing ways to enhance their own and others’ performance.

DCSP 4.2 Students demonstrate basic tactics and strategies to achieve identified goals in games, sports or other physical activities

EPD 4.3 Students explain how factors, including challenges and inherited characteristics, influence physical, social and emotional growth and development.

• Students research safety issues that need to be considered when designing a children’s’ game show.  
• Students engage and participate in gross motor activities of their own design or selected from research in order to test possible games to include in the show  
• Communicate and cooperated in groups

SCIENCE EC 4.1 students design and perform investigations into relationships between forces, motion and energy.

NPM 4.3 Students examine and assess ways that materials can be changed to make them more useful.

• Students investigate how different relationships between forces, motion and energy can affect certain games.  
• Students describe and explain how they adapted different materials for better use according to their design challenge.

ICT - ICT are to be integrated and used where applicable through all KLAs. Presentations will be constructed via PowerPoint, and students will be encouraged to think about how they might incorporate ICT into their submission. For example: Students could develop a website to help promote their submission, create a blog as their diary of technological practice, take and edit digital photos, and create digital video package.

**Assessment**

<table>
<thead>
<tr>
<th>TECHNIQUE</th>
<th>INSTRUMENTS</th>
<th>OUTCOMES</th>
<th>RATIONALE FOR ASSESSMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OBSERVATION</strong></td>
<td>Checklist, Anecdotal Records</td>
<td>TP 4.1, TP 4.2, TP 4.4, INF 3.2, MAT 3.1</td>
<td>Constant and continued observations throughout the phases of learning will enable a teacher to reflect upon student participation, attitudes, and work ethic.</td>
</tr>
<tr>
<td><strong>CONSULTATION</strong></td>
<td>Anecdotal Records, Reflection Activities</td>
<td>TP 4.1, INF 4.1, MAT 4.1, MAT 4.2</td>
<td>Consultation is used here to encourage students to justify their designs and help them to identify where they have started and what they need to do to ensure success in their vision.</td>
</tr>
<tr>
<td><strong>FOCUSED ANALYSIS</strong></td>
<td>Oral Presentations, Journals</td>
<td>TP 4.2, TP 4.4, INF 4.1</td>
<td>Focused Analysis here is a formative assessment where students work is critiqued upon completion of their projects by the teacher. Should be done via a set of criteria standards.</td>
</tr>
<tr>
<td><strong>PEER ASSESSMENT</strong></td>
<td>Peer/Self Assessment Sheet, Gallery walk</td>
<td>TP 4.4, MAT 4.1, MAT 4.2</td>
<td>Allows students to appreciate the work of others while allowing them to critically analyse their own in comparison. Also allows students a chance to justify their work and inclusions of certain elements in their designs in an assessable group situation.</td>
</tr>
</tbody>
</table>

**Context**

**Personal:** On an individual level, group work helps develop interpersonal skills and communication. This task also assists to develop problem solving skills, decision making skills, creative and critical thinking.

**Economic:** As there is a cost restriction involved students are to use best judgment to complete the design challenge through the promotion of budgeting skills while at the same time ensuring a quality piece.

**Industry:** Students are involved in the industry of the television media during this challenge. This enables students to understand the functions involved with creating, pitching and producing a television show.

**School:** This challenge provides the school community with a highly creative, active, and interesting challenge that is based on collaborative work and supportive school environments. It also enables a school to support technology education through such a rich task.

**Leisure and recreational:** Designing an outdoor winter sporting facility for both professional and recreational use.

**Appropriateness**

**Functional:** Students build suitably functioning models of their shows set(s) that meet the specifications of the design challenge. The product should also be able to be translated into a “real” viable television show set and idea.

**Aesthetic:** Designs should be dynamic and engaging and aim to entertain the potential viewing audience of the show.

**Ethical:** The design challenge should provide opportunities for students to work effectively within a supportive school environment. The show should endeavour to be non-discriminatory and promote positive attitudes and break down stereotyping or bias.

**Social:** Students will work collaboratively in a supportive environment to develop communication, teamwork, interpersonal and leadership skills.

**Environmental:** Recycled materials should be used where possible. The show should also be designed to positively affect individuals and society.

**Resources**

**Budget:** The total cost of the shows production should not exceed $10. **(Final financial outlay, $9.20. **$.80 under budget**)**

**Materials:** Lego, paddle pop sticks, old toys, afloil, glad wrap, wood, balsa, cardboard, paper, plastic containers, slime, scrap materials, contact, paint, toilet rolls, felt, straws, pipe cleaners, play-doh, cello, matchsticks, LED lights, a battery, feathers, cotton balls, tins, tube, beans, checkers.

**Tools:** Glue, scissors, Stanley knife, sticky tape, super bond, ruler, rubber, pencil, PC, Printer.

**Management**

**Managing people:** Within groups students discuss and determine their individual jobs in order to complete their task. Effective management should be put in place at the commencement of the challenge so that a system of operation should be evident within the group.

**Managing resources:** All measures are taken to ensure there is an even distribution of resources for students to access what they require. Students should be encouraged to “pool” resources they bring in to class so that all have a chance to use sourced materials.

**Managing opportunities:** Students are encouraged to see the design challenge as an opportunity to be creative, dynamic, imaginative, and explore new and interesting and new domains. In this case the role, purpose and creation of media.

**Managing constraints:** Students will need to complete their designs in allocated amount of time before submissions are due (8weeks). Resources are to be managed in an effective and fair way. Students may have to negotiate within their group and other groups in order to have the resources they need to complete their task. Students will develop an effective management strategy to help identify and reduce negating constraints where possible. It is essential students stay below budget ($10) and should budget funds in the most effective manner.

*Through Working Technologically* As students develop their television shows they will be working technologically while becoming complex and creative thinkers through the problem solving process.
### Design Challenge: Australian Shelter

Design Challenge – This design challenge is based around the popular reality television show ‘Survivor’ (Australian Outback, series two). The design challenge is to construct a model shelter (shoebox size) made out of natural materials that can be found in the Australian Outback. These materials included sticks, twine (i.e. lamentra) and paper bark (off a paper bark tree). The shelter needs to be able to house a maximum of eight (8)/minimum 2 people and sustain a substantial amount of wind and rain damage. Students will have three (3) 1 hour lessons to complete and present their model shelters.

### Outcomes, Levels and Strands:

**Strands** - This design activity incorporates all of the four Technology strands. They include technology Practice, information, materials and systems.

**Level** - The design challenge is aimed at Level Three (3)

**Outcomes -**

**Technology practice** level three outcomes include

- **TP 3.1** Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
- **TP 3.2** Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
- **TP 3.3** Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
- **TP 3.4** Students test and judge how effectively their own and others’ processes and products meet the design challenge.

**Information** level three outcomes include

- **INF 3.1** Students describe advantages and disadvantages of different sources and forms of information.
- **INF 3.2** Students select and use techniques for generating, modifying and presenting information for different purposes.

**Materials** level three outcomes include

- **MAT 3.1** Students choose materials according to various characteristics that best suit the product and user.
- **MAT 3.2 Students** select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

**Systems** level three outcomes include

- **SYS 3.1** Students identify and describe relationships between inputs, processes and outputs in systems.
- **SYS 3.2 Students** assemble and trial systems they design by considering inputs, processes and outputs.

### Activities:

**Investigation**

- Students will research different kinds of shelters in order to draw ideas that will assist in the creation of their model shelter.
- Students will investigate materials that are suitable for outback environment.
- Students will identify the problems they may come across during construction of the model shelter.

**Ideation**

- In small groups of 2 or 3 students will brainstorm and complete a draft copy of their model shelter.
- Students will identify and fix problems that may arise during the planning of the model shelter.
- Students will find appropriate natural materials outside of the classroom to use on model shelter.

**Production**

- Students will work together as a team to construct the model.
- During production students make not of characteristics that have changed to their original design.
- Students are identify and fix problems that may arise during construction.

**Evaluation**

- Each group will present their model shelter and list what aspects make their model durable, suitable and unique.
- Students test these aspects through the use of a water spray bottle and an artificial wind source of their choice (i.e. Cardboard, mini fan etc).
- Students reflect on the process of construction (alterations, responsibility and materials).
Crosscurricular Learnings:

**Science**: Investigate the Australian outback eco system

**Art**: Students learn how to sketch with the medium of charcoal (shading, shadowing etc)

**Mathematics**: Students focus on the concept of Measurement (length and area)

Assessment Ideas:

- Observation of student/s group commitment, team working skills and problem solving skills
- Marking/checking of model draft copy (adjustments/enhancements etc)
- Peer and self assessment through the use of evaluation sheets (of end product)

Context:

**School** – Working in a cohesive team environment, working within an allocated time frame and working with natural materials only

**Global** – Designing and constructing a model shelter that could be built anywhere in the world (not just Australian outback)

**Personal** – Building/creating an individual model shelter that caters to the needs and wants of the designer

Appropriateness:

**Environmental** – The model shelter will be constructed from ‘natural’ materials only (sticks, leaves, bark etc)

**Economic** – The model is made from natural materials so there are minimum economic constraints (students can purchase and bring in ‘natural’ materials as long as the budget is within $10 and the material can be found in the Australian outback)

**Durability and suitability** – The shelter must be able to house a maximum of 8 people and a minimum of 2 people, whilst still being able to withstand mild wind and rain damage

Resources:

- Scissors, rulers, paper and pencils (for draft sketch)
- Cardboard boxes to house model shelter
- Natural materials collected from the school/home environment
- Any other natural materials purchased within a $10 dollar budget (appropriate for an outback shelter)

Management:

- The teacher will hold a class discussion about safety prior to the construction of the model shelter
- Students within the group will manage the allocation of jobs, materials used and any changes/alterations on model shelter
- Students will need to control and manage their construction within the allocated time frame
Healthy Eating, Special Friends Recipe Book - Kelly Farrelly and Lydia Berndt

Design Challenge: Healthy Eating, Special Friends Recipe Book
Good morning Year Four's! The aim of this design challenge is to ask a special person in your life, what their favourite healthy choice recipe and present a page that can then be included in a class recipe book. You are to use the computer to create your recipe page, using Microsoft Publisher or Microsoft Word, and include a digital photo of you and your special person, as well as pictures of the chosen recipe, if available. It must be 1 A4 page, and graphically appealing. This recipe book will then be sold at the school fete in November, to raise money for the Australian Heart Foundation! So Year Four's, be creative, use healthy, yummy recipes and create them in an exciting way so our buyers will be bursting at the bits to cook your recipe!!! Come on Year Four’s, the Heart Foundation is counting on you!!!

Outcomes, Levels and Strands:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information
INF 3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:
Investigating
Students have been learning about Healthy Lifestyles in Health, and are to use their new found knowledge to select appropriate material for this challenge. Students already have computer skills and know how to use Microsoft Publisher and Microsoft Word. Students look through many different cookbooks and recipes and look at the different structures of cook books and the language and abbreviations used, e.g. tsp means teaspoon, Tbsp means tablespoon. Students should note the way in which ingredients are listed and how the method is presented to the reader. A home economics teacher is invited into the classroom, and students participate in a class demonstration of how to follow instructions in a cookbook and create Rice Crispy Squares. Students take notes during this demonstration in order to understand the concept of a recipe. Students search the internet for recipe ideas.

Ideating
As a class students start to brainstorm discuss ideas of how they can present their recipe book. Students look at how they will be presenting the book. The cover design, letter to buyer and price (in which will be $3.00 for production and $7.00 donated to Heart Foundation), is discussed in order to make everyone aware of the purpose for this challenge. Students collaborate their ideas and decide which materials they will use and who their special person will be. Students set out to ask their special person what their favourite recipe is and begin to research this recipe using the internet and books. Students bring in several recipe choices to share with the class where they will decide through elimination which is the healthiest recipe for the book and ensure there is a variation of recipes, none being too similar.

Producing
Students gather a digital photo of them self and their special person to include on their recipe page. Students are given class time to use computers to create their recipe page. Once individuals have their recipe page contribution for the book, they collaborate them as a whole class and begin to shape the recipe book. In small groups, students write a letter to the buyer to explain the reason for producing this book, (e.g. to raise money for the Heart Foundation), and then come together and use each others ideas to produce a final class letter for the book. Students have class photo taken to be placed in book as a signature page, in which everyone will sign. Selected students will produce a contents page including every students recipe. Other selected students produce a cover page for the recipe book which must include name of book, price and Heart Foundation logo, as well as a picture. Whole class brings final product together and create an assembly line to print off 100 copies of each book, and to then bind them together. Students help out on the day of the fete to sell book.

Evaluation
Students record the difficulties and problems that arose during the production process, and working as a whole class. Students present their contribution of their recipe page to the class. Students justify their choices by explaining the healthy option they have chosen and how they would improve the recipe for next time. During this process students identify the ways in which they can create an aesthetically pleasing product that will sell, in order to raise money for a charity.

Context:
Personal: Group work promotes the growth of sound interpersonal skills, and the design challenge fosters personal skills such as problem solving, decision making, time management and critical thinking.
Economic: Students will incorporate production costs and review how much money will be donated to the Heart Foundation.
School/Community: Through group-work and presentations, students work collaboratively with their peers, teachers, the school community and also the wider community as the challenge is for a real life purpose in a real life context, in this case, raising money for a charity.

Appropriateness:
Functional: Is the recipe book easy to read and follow? Does it use appropriate language?
Aesthetic: Is the book visually pleasing, exciting and will it promote sales?
Social: Are the contents of the book appropriate for use within all social groups?
Economic: Are the production costs covered in the purchasing price of the book? Is there a reasonable amount of money being donated to the Heart Foundation?
Cultural: Is their cultural diversity and variation of recipes within the contents of the book?
Cross curricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activities</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Looking through recipe books looking at language and structure.</td>
<td>Cu 3.2, Cu 3.1, Op 3.1, Op 3.2, Cu 3.3 Op 3.3</td>
</tr>
<tr>
<td></td>
<td>Students construct letters and content pages.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Students orally present their recipe page to class.</td>
<td></td>
</tr>
<tr>
<td>Visual Arts</td>
<td>Students present their recipe book in an aesthetically pleasing way, using colour, photos, and different fonts.</td>
<td>VA 3.1, VA 3.3</td>
</tr>
<tr>
<td>Maths</td>
<td>Students have a lesson on volume, matter and measurement particularly pertaining to measurement for their recipes. And learn of the different measurements used in cooking.</td>
<td>3M2, 4M2</td>
</tr>
<tr>
<td>HPE</td>
<td>Students investigate healthy lifestyles and healthy food options.</td>
<td>PHIC 3.2</td>
</tr>
<tr>
<td>SOSE</td>
<td>Students look at recipes from different countries.</td>
<td>CI 3.3</td>
</tr>
</tbody>
</table>

Assessment Ideas:
Rubric: Students will be introduced to rubric at beginning of challenge that will describe what is expected of them, this will be used throughout challenge. This will be graded at end for marking final product.

Observation/Anecdotal notes: Teacher should observe and take notes of students progression and understanding of concepts throughout challenge.
Self/Peer Assessment: When students are presenting ideas to class, students are assessing themselves and peers by process of elimination to reach a certain goal, in this case most appropriate healthy recipe.

Resources:
Computers with Microsoft Publisher and Microsoft Word installed and internet
Digital Cameras – Free from home or school
Coloured ink and printer – Free, school provide
Paper - 10c per piece with printed recipe on
Binding: Cover and back, binding machine - $2.00
A range of recipe books for perusal – Free from home

Management:
Managing People: Within their groups students collaboratively discuss and determine their individual jobs in order to complete their task. All students at commencement of the challenge will be aware of the rules of participation in group work.
Managing Resources: Students will be provided resources at school and will need to use computers during class time. It is expected that they will bring recipe books from home as examples, if available.
Managing Opportunities: Students must all be given access to resources (people, computers, production instruments) to allow every possibility of success for the groups.
Managing Constraints: Students will need to complete their individual pages in the designated time and with the resources that are provided. They will need to negotiate within their group and possibly other groups in order to meet the selected criteria for the challenge. Students will develop a plan and steps that will work them through the challenge and have them completing it by the deadline.
Design Challenge: The Ultimate Movie Monster

Your school has been approached by some Hollywood movie producers wanting a design for a new monster to have a starring role in the sequel to Monsters Inc. Your model, which can be of any design you wish, cannot exceed 45cm x 45cm x 30cm. Upon completion you will present your monster to the producers describing its personality, abilities and special features.

Outcomes, Levels and Strands:
Technology Practice Level 3

TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.

Materials level 3

MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:

Investigation
Students will brainstorm the features/abilities/personalities of monsters and characters from various sources such as, movies, books and television programs. Using a ‘Y’ chart, students develop their ideas of what makes a monster scary or interesting.

Ideation
Students will produce labeled designs for their ultimate movie monster based on the information and ideas gathered by the class through earlier discussion. Students will decide and list the materials and tools they will need to create their monster. Discuss with students realistic goals for their monsters, with the view that they may need to compromise based on the resources available and their budget. Discuss safety issues.

Production
Students individually construct their own “ultimate movie monster” based on their designs, using appropriate materials and tools, compromising on their designs when necessary.

Evaluation
Students present their finished monster to the class, who are in the roles of the movie producers. Students will discuss issues that presented themselves during the production phase of the design challenge and the reasons their monster should be given the starring role in the movie. Their classmates will ask questions about the monsters personality, abilities and its special features, giving the creators feedback.

Crosscurricular Learnings:

English- labeling, oral communication, creative writing, persuasive speech techniques
Maths- budgeting, designing to scale
Art- designing plans, 3D model of monster, aesthetic awareness

Assessment Ideas:
Students will be assessed by:
• Participation in group discussion.
• Creativity and appropriateness of materials used. Quality of the product constructed.
• Oral presentation in front of the class ie persuasive speech techniques.
• Teacher observation and evaluation of the design.

Context:

• Personal- students interests
• Leisure and Recreational- cinema
• Global- mass appeal

Appropriateness:
Economical- Have the students adhered to the set budget?
Aesthetic- Is the monster visually appealing?
Social/Cultural- Are students with special needs being catered for?
Functional- Will the monster created be integrated well with other characters and the context of the movie?

Resources:
Monsters Inc movie
Prior knowledge of monsters
Recycled materials- newspapers, old jewellery pieces, wire, chicken wire
Googly eyes, synthetic fur, gold coloured thread approx cost $10
Management:

Managing people
• Teacher to monitor student progress and keep them on task

Managing resources
• Students provide some resources from home
• Distribution of the materials will be at the discretion of the teacher

Managing opportunities
• Class book with images of student creations with a short description of its features.

Managing constraints
• Students will need to consider time, resource availability, budget and task requirements.
Design Challenge: S.P.I.C. 2010
During a recent trip to the Pacific Ocean, a small group of government officials have discovered a small island off the east coast of Australia. Secretly, the government plans to build the world’s first self-contained living community on this newfound land. They have named the project, Secret Paradise Island Community 2010 or “S.P.I.C.”. Tirelessly, government officials have searched the country to find a young person willing enough to aide in the design of this new community. At last, their long search is over.

The following information is highly classified and should only be read by the chief designer of this new community... you.

Task Constraints and Opportunities:
Your community must meet the following requirements:

- A scale model must be created that fits in a space with the dimensions: 450mm x 450mm x 300mm
- The materials used to build the model must not exceed AUD$10.
- The model must be completed by the end of a 5-week period.
- The island is a circular shape with a diameter of 60 metres, relatively flat and currently has nothing on it but sand.
- The island must cater for the needs of at least seven (7) people inhabiting the area.
- The only connections to the rest of the world are via water-based transportation and a digital satellite uplink.

The rest is up to you... good luck.

Rationale:
This design challenge has been created to allow students the opportunity to gain a deeper understanding of the systems that communities have become so dependent on and investigate alternate methods of providing the same resources to a community through a design process. A design process allows the students to engage in the content through a hands on, heads on and hearts on a approach that engages the learners to utilise both lower order and higher order thinking skills while integrating curriculum from a wide variety of key learning areas.

Outcomes and Strands:
Year Level: 7.
Technology Practice
TP4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP4.3 Students identify and make use of practical expertise of others when following production procedures to make products for specific users.
TP4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information
INF4.1 Students analyse sources of information and match these to the requirements of design challenges.

Materials
MAT4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Systems
SYS4.1 Students identify and explain the logic of systems and subsystems.
SYS4.2 Students incorporate feedback to refine and modify systems and/or subsystems.

Contexts:
This design challenge allows students to look at and work in personal, community, industry, agriculture, leisure and recreation contexts.

Resources:
Construction Resources:
All materials exceeding the budget of $10 must be recycled or deemed as no longer needed.
Cutting and adhesive utensils are limited to low strength glue, child safe scissors and sticky tape

Design Resources:
Digital design of communities can be created using software such as Microsoft Word, Publisher or Image editing software. Alternatively, designs can be hand drawn.

Research Resources:
Research sources will include library access and internet use.

Human Resources:
Even though students will complete the task during school time; they will be encouraged to actively find people in the community that can aide in the design process.

Appropriateness:
This task will require students to look critically at their design solutions in terms of functional, aesthetic, social, cultural, environmental, economic and ethical appropriateness.
Management:
While investigation and ideation outside of the school is encouraged, production of the design solution will take place at school and students’ work will be kept in the classroom to minimise the risk of damage being inflicted on the creations.

Crosscurricular Learning:

<table>
<thead>
<tr>
<th>English</th>
<th>Mathematics</th>
<th>HPE</th>
<th>Science</th>
<th>SOSE</th>
<th>The Arts</th>
</tr>
</thead>
<tbody>
<tr>
<td>OP 4.1 4.2</td>
<td>N 4.1 4.2 4.3</td>
<td>DCSPA 4.2</td>
<td>SS 4.1 4.3</td>
<td>TCC 4.4 4.5</td>
<td>VA 4.1</td>
</tr>
<tr>
<td>CU 4.1 4.2</td>
<td>PA 4.2</td>
<td>PHIC 4.1 4.2 4.4</td>
<td>EB 4.1 4.3</td>
<td>PS 4.5</td>
<td></td>
</tr>
<tr>
<td>CR 4.1 4.2</td>
<td>M 4.1</td>
<td></td>
<td>EC 4.2 4.3</td>
<td>SRP 4.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CD 4.2</td>
<td></td>
<td>LL 4.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S 4.1 4.2</td>
<td></td>
<td>NPM 4.1 4.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Activities:

Investigating
Students investigate the needs of a community including shelter, food, and water as well as the systems involved in providing a community with such things. Students also investigate through experimentation and research different materials for constructing the model to fit within the constraints. Further investigations may look at specific issues that arise at any phase of the design process.

Ideating
Students apply the information gained through investigation to create a scale sketch or digital design of the model of the design solution with a strong emphasis of satisfying the design challenge and in accordance with the seven aspects of appropriateness. Ideation could also exist if issues arise at any other phase.

Producing
Students should construct the model based on the design they initially created. The end product should align well with the design sketches and be based on the information investigated, but in many situations, the producing phase will be a very rich investigation process of its own.

Evaluating
Students evaluate their’s and others’ final products using criteria based on the seven aspects of appropriateness. During the investigating, ideating and producing phases, students evaluate the information gained from investigation, possible designs and methods of production.

Assessment:

Formative:
Formative assessment should be used to allow teachers to monitor through observations, checklists and anecdotal records the progress of students continuously throughout the design process. Specific things to be aware of are: ensuring that students are moving through the phases efficiently and are giving themselves every opportunity to complete the task; students are utilising cross-curricular skills to enhance their products; opportunities to open debates or discussions around needs versus luxuries, or appropriateness; and identifying any knowledge or applications of knowledge that may need to be re-iterated or re-enforced to lead to greater success in their creations.

Summative:
Summative assessment will take the form of a portfolio of work demonstrating the process the students have undergone to arrive at the final product, following all the phases of the design process. An oral presentation will also be a component of this, which allows students to present the design solution to the rest of the class. Modifications could also be made if time permits to allow the students to create a marketing campaign for the design solution.

Risk Management:
All equipment used must be recognised as safe and supervised fully at all times. Specific provisions include using only plastic, child safe scissors for cutting, and using adhesive equipment limited to no high strength glues, and the use of sticky tape, or blu-tac. Materials used should not include substances containing asbestos, glass, or mirrors, as these can be very harmful. This will extend students further by asking them to look for alternatives to mirrors and class when creating their solution. Again, having the students complete the construction at school allows the teacher to monitor and manage risks.
Learning Centre of the Future - Renae Tuckey, Alice Foster and Rachel Woodford

Design Challenge: Learning Centre of the Future
Describe Design Challenge Arial 9 point font
Your mission is…………….. To design a learning centre for our school that will provide us with an interactive environment to learn about the way of the future, and the benefits and necessities of an environmentally friendly self sufficient building.

Outcomes, Levels and Strands:
Technology Practice
TP3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP3.3 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information
I3.1 Students describe advantages and disadvantages of different sources and forms of information.
I3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials
M3.1 Students choose materials according to various characteristics that best suit the product and user.
M3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Systems
S3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:
Investigation Students research what a sustainable building is, what characteristics and environmentally friendly technologies it contains and what the main differences are from a typical existing building today. Students begin to gather and interpret information from a variety of sources including magazines, books, internet, newspapers, brochures, family and human resources. Students have the opportunity to visit and tour the ‘Eco Village’ at Currumbin to explore and experience a sustainable community in operation. Using the information from this experience students examine resources used in the Eco Village and look at how they could replicate these by using appropriate recycled materials they can utilise when constructing their own design challenge. The students will each keep a working journal of their experiences while working in their group.
Ideation Students generate possible ideas using mind maps and diagrams within their group as what they envisage the learning centre to look like. Students design the learning centre using a 2D drawing. As a group students’ communicate what their plan of attack will be and organise what role each member will undertake. Students gather appropriate materials needed, keeping in mind the design challenge guidelines including the size of model and the $10 budget.
Production Students work towards finalising their design of the model and create a time line to use in directing them to complete the model in the allocated time. Students confirm the sustainable technologies to be incorporated and the positioning of these within the building and the surrounding land. Students begin constructing their sustainable learning centre using the selected materials they have collected. Students continuously refer to their time line to ensure they are on schedule for completion and can maximise the use of efficient time management. As a group students work collaboratively and continually evaluate both their individual and group input.
Evaluation Students reflect on the production process and record any problems and challenges that arose during this process. Students evaluate and make judgments on the choices made as a group including appropriateness of building design, materials used, production methods and group management. Students take part in a design walk to compare the features and benefits of their peer’s designs. Students discuss and make a final journal entry as to what if any modifications to improve their design would be needed.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand Level and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics</td>
<td>Budget restriction</td>
<td>Space - Location, direction and movement</td>
</tr>
<tr>
<td></td>
<td>Money management</td>
<td>S 3.2 Students interpret and create maps and plans using a range of conventions, describe locations and give directions using major compass points, angles and grids.</td>
</tr>
<tr>
<td></td>
<td>Measurements and boundaries</td>
<td>Measurement - Length, mass, area and volume</td>
</tr>
<tr>
<td></td>
<td>Shape and spatial design</td>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
</tr>
<tr>
<td></td>
<td>Scale drawings of model</td>
<td>N3.1 Students compare, order and represent whole numbers to 9999 and common and decimal fractions, calculate cash transactions and describe other methods of payment.</td>
</tr>
<tr>
<td>SOSE</td>
<td>Environmental problems</td>
<td>Place and Space PS3.1 Students compare how diverse groups have used and managed natural resources in different environments.</td>
</tr>
<tr>
<td></td>
<td>Reduce, Reuse, Recycle</td>
<td>PS3.2 Students create and undertake plans that aim to influence decisions about an element of a place.</td>
</tr>
<tr>
<td></td>
<td>Sustainability (Eco friendly)</td>
<td>PSD3.6 Students cooperatively identify an environmental issue of concern and contribute to its resolution.</td>
</tr>
<tr>
<td></td>
<td>Group work</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>Design journals</td>
<td>Speaking and Listening - Op3.1 When speaking, students: use logical sequence when organising idea, use stages of generic structure, patterns of clauses, text connectives, conjunctions and specialist words according to the text type and medium, use statements, questions and commands to generate and maintain discussions and conversations, use processes and attributes that offer opinions, speak audibly and with clarity by using projection, articulation and appropriate volume.</td>
</tr>
<tr>
<td></td>
<td>Steps of construction brainstorming, listing etc</td>
<td>Cr3.1 When speaking, students: use aspects of subject matter and resources to construct positive or negative representations of people, places, events.</td>
</tr>
<tr>
<td></td>
<td>Interviews with human resources.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Oral presentation</td>
<td></td>
</tr>
</tbody>
</table>
and things to achieve their purposes.

Writing and Shaping – Cr3.3 When writing and shaping students choose aspects of subject matter and particular attributes, processes and visual resources to construct positive or negative representations of people, places, events and things.

<table>
<thead>
<tr>
<th>The Arts</th>
<th>Construct model and create design elements to be aesthetically pleasing and life like. Design a multimedia presentation to present model.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Arts VA3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings. VA3.2 Students make and display images and objects understanding the functions of informal and formal display.</td>
<td></td>
</tr>
<tr>
<td>ME3.2 Students present media texts to a specified audience using presentation techniques associated with particular media forms.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science</th>
<th>Investigate and apply ecologically friendly system and structures to make for their model.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science and Society – 3.3 Students make predictions about the immediate impact of some applications of science on their community and environment, and consider possible pollution and public health effects.</td>
<td></td>
</tr>
<tr>
<td>Energy and Change – 3.3 Students identify different ways of obtaining energy</td>
<td></td>
</tr>
<tr>
<td>ECD3.4 Students consider how reducing and recycling waste reduces energy consumption</td>
<td></td>
</tr>
</tbody>
</table>

**Assessment Ideas:**

Observation – Observe students planning and working on model while teacher asks effective questions about their progress while note taking.

Criteria Sheet – Model/ Presentation – did students meet criteria for both of these aspects

Self Assessment – students use self assessment to reflect on their own work and their ability to work with other group members.

**Context:**

Individual - Students learn about the importance of sustainability and the impact it could make in their world.

Family – Students can share knowledge on eco-friendly aspects that they can easily incorporate into their homes.

Communities – Students consider how their design may benefit and include whole community involvement.

Business – Students consider the design when marketing to ensure aesthetically pleasing to future investors.

Global – Students research eco friendly buildings to decide which designs suit different environments that exist in the world.

** Appropriateness**

Aesthetic: Students consider the look and style of design.

Economic: Students consider affordability to community and will it be financially viable.

Environmental: Students consider using natural materials and recyclable aspects in the design.

Functional: Students consider the functionality of having a learning centre in schools for interactive learning to take place.

**Resources:**

- **Resources from home and work (free)**: Wood / Timber, Glue, Perspex, MDF / Plywood, Dowel, Plastic container, Timber floor samples, Solar Panels, Fairy lights

- **Human Resources**: Straw, Paint (Dulux Manager), Charmain – Architectural designer (Friend), Tiles, Jigsaw and Coping saw (Friend’s tool bench), Sandpaper

- **Resources bought**: Clay, Cardboard / corrugated, Crepe paper, Tiles, Plastic container, Total spent: $9.60

**Management:**

Managing people: Cooperation of all group members to work together as a team. Setting up roles for each individual group member.

Managing resources: Basic materials provided to students e.g. glue, paint, clay, cardboard, paper. Safety aspects considered e.g. no power tools such as drills and saws used by students. Students are to collect the majority of materials from home.

Managing opportunities: During presentation students talk about the processes they went through to finish their model including a list of materials used, money spent, and a sketch used in the design. All groups will do a gallery walk of all of the models built in the class. Students can then reflect on some of the different design strategies and consider what they could improve on within their own design model.

Managing constraints: The $10 Budget, the size that the model is constrained to (450mm x 450mm x 300mm) and time to complete before the due date.
The Beach Hut - Tom Clements and Craig Newton

Design Challenge: The Beach Hut

Picture this... You are enjoying a nice leisurely holiday sailing through the Caribbean when disaster strikes! Your boat is capsized by a massive rogue wave and soon sinks to the bottom of the ocean. You somehow manage to escape the sinking vessel and swim to a nearby island. The island is completely deserted, showing no signs of any human inhabitants. Luckily, you find washed up on shore with you a knapsack containing a large ball of string, a knife, and an open container. You are stranded. No one knows where you are and it may be days, weeks, or even months before anyone finds you. Your survival instincts are about to set in.

You are required to build yourself a shelter out of the natural materials you would find on a deserted island. In addition to this, you are permitted to use the items contained in the knapsack to aid in the construction of the shelter. Your shelter must be built within the physical size constraints of 450 mm x 450 mm x 300 mm. It must provide adequate protection from strong winds, and must be relatively waterproof. On top of this, you are going to need to devise a method for collecting and storing fresh water.

Good luck and happy building!

Outcomes, Levels and Strands:
TP 3.1- Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges
TP 3.2- Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3- Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4- Students test and judge how effectively their own and others’ processes and products meet the design challenge.
INF 4.1- Students analyse sources and forms of information and match these to the requirements of design challenges.
MAT 3.1- Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2- Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
MAT 4.1- Student explain how characteristic of materials affect ways they can be manipulated.
SYS 4.2- Students incorporate feedback to refine and modify systems and/or subsystems.

Activities:
Investigation: Students work individually to investigate the importance and impact the need for shelter and water is for survival. Students investigate a range of cultures that rely and utilize the environment to provide their necessities. Students come together into groups of four to share their findings.
Iediation: In their groups of four, students begin elementary sketches and designs for their ideal shelter, and label the design features and their function in the overall design. Students critique their designs and decide what elements are feasible and what materials would be best suited to their needs. Sketches and designs are modified to incorporate the new design elements.
Production: Students finalize their design, including labels of materials to be used, and describe their construction methods (including measuring, cutting, joining etc). This final design must be done to scale and with correct measurements. Following this, students begin the construction of their shelters, making amendments to their designs where necessary.
Evaluation: Upon completion of their shelters, students prepare their constructions for display within a gallery walk. Students must prepare an accompanying rationale, which describes how they designed their shelters to meet the design requirements, why each type of material was used, what problems they encountered along the way and how these problems were solved. Tests are conducted to evaluate the functionality of each design. Compare the results of all designs to decide which shelter has the best design features.

Crosscurricular Learnings:
<table>
<thead>
<tr>
<th>KLA</th>
<th>Strand, Level &amp; Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPE</td>
<td>PHIC 3.5, 4.5, PA 3.4, EPD 3.4</td>
<td>Through investigation stages, students consider the environmental aspects of where they would be constructing their shelter, and how these elements may affect their and others’ health. Students develop physical activities they would be able to do with the limited resources on the island. Through the entire process, students work together collaboratively to design, create and present their design solutions.</td>
</tr>
<tr>
<td>Science</td>
<td>Earth &amp; Beyond 3.1, Life &amp; Living 3.1</td>
<td>Students investigate weather cycles of the geographic location their island is and how they will affect the construction of their shelters. Students highlight the influences the environment they are in will affect them.</td>
</tr>
<tr>
<td>SOSE</td>
<td>TCC 3.1, PS 3.1, CI 3.4, SRP 3.1, 3.3</td>
<td>Students investigate the history of Aboriginal, Torres Strait Islanders and other island cultures and the technology they have used to create shelter, and how technology has changed the way in which they live. Students develop an understanding of the water cycle and the role it plays in every day life and survival. Students must work together in a group situation and come to agreements the whole group is happy with.</td>
</tr>
<tr>
<td>Maths</td>
<td>M 3.1</td>
<td>Students are required to use measuring and estimation skills during the design and</td>
</tr>
</tbody>
</table>
**Assessment Ideas:**
Students will be assessed on their design challenges according to negotiated criteria. The majority of assessment will be summative, but a small portion will be formative. Assessment strategies should include:

- **Observation:** A checklist should be created to monitor and assess student participation in group work (summative).
- **Focused Analysis:** This will include students handing in hard copies of their preliminary sketches (summative), final design and the final product (formative). Also, student journals will be handed in (summative).
- **Consultation:** During student presentations of the rationale, students will be given the opportunity to ask questions in regards to the design (formative). In addition students will be assessed on the creativity of their shelter designs, with importance placed upon innovation and originality here.

**Context:**
Agriculture: Students learn to interact with their natural environment and surroundings.
Communities: Students engage in research about island communities when planning their design challenges.
Home and Family: Students investigate the basic necessities for a sustainable home lifestyle.
Industry: Students actively engage in the physical design and construction of their shelters.
Personal: Students decide what features and elements their designs have to suit individual needs and wants.

**Appropriateness:**
- **Aesthetic:** Does the shelter look like it could be lived in comfortably?
- **Cultural:** Do students research background cultural information in regards to the design/structure of the shelter?
- **Economic:** As the product is made from all natural resources, it will be economically appropriate.
- **Environmental:** During construction of the shelter, did students demonstrate environmental awareness by using only natural resources? Were any trees or plant life damaged to the point of death?
- **Functional:** Does the design challenge meet the requirements as stated? Is the designed shelter functional and weather resistant?

**Resources:**
Palm Fronds; Plant Weaving Expert; String ($2.95); Knife; Other natural materials

**Management:**
- **Managing people**
  - Students will complete their design challenges in small groups, whereby peer collaboration will allow students to prepare higher level responses to the task.
  - Students will be provided with access to someone who is familiar with palm frond weaving, to assist them in their design constructions.
- **Managing resources**
  - Prior to construction, students are encouraged to bring in recycled plant materials from home. The teacher should provide some materials for student use, to ensure equal access to all construction materials.
- **Managing opportunities**
  - Ample time during class time should be allocated for students work on each stage of the process (investigation, ideation, production, evaluation). Opportunities to investigate and learn about new and different cultures are provided.
- **Managing constraints**
  - This design challenge is well suited to students located near to the beach as they will have a sound prior knowledge of island living. Students with lack of access and understanding of the set context are able to develop an awareness and appreciation of this new context.

<table>
<thead>
<tr>
<th>English</th>
<th>Construction of their design solution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cu 3.1, 3.3, Op 3.1, 3.2, 3.3</td>
<td>Students write creative pieces about the shelter, who lives in it, and how they came to be there. Students are required to present to the class a rationale of their design.</td>
</tr>
<tr>
<td>VA 3.2, 3.3</td>
<td>Prior to construction, students will create pictures of how they want their shelter to look. They compare a variety of cultural images depicting shelters and decide on key elements they want in their own shelter.</td>
</tr>
</tbody>
</table>
Design Challenge: A Fun Classroom for Kids made by Kids

Next term, Year 2C has been given a new classroom but it hasn’t been decorated yet. In a pair your task is to design their classroom. Year 2C’s teacher has asked that you include fun and interactive maths and literacy learning tools. The integrated studies theme that the class will be doing next semester is ‘The Sea’; therefore an area needs to be provided for the teacher and class to add resources to. A design folio is provided to assist you with your design challenge.

Outcomes, Levels and Strands:

<table>
<thead>
<tr>
<th>TP4.1</th>
<th>INF 4.1</th>
<th>SYS 4.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.</td>
<td>Students analyse sources and forms of information and match these to the requirements of design challenges.</td>
<td>Students identify and explain the logic of systems and subsystems.</td>
</tr>
</tbody>
</table>

Activities:

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>TEACHING STRATEGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigation</td>
<td>Students research ideas to decorate a classroom. They will interview Year 2 students to find out what they would like in a classroom and what learning tools they use for maths, literacy and integrated studies. Students will also view other Year 2 classrooms to see how they are set up. All research to be recorded in the design folio.</td>
</tr>
<tr>
<td>Ideation</td>
<td>Students use strategies outlined in their design folio to share their ideas with others and record the best way to decorate their classroom. Students discuss, plan and note in their folio, requirements and constraints for design (criteria, budget, time, resources and appropriateness).</td>
</tr>
<tr>
<td>Production</td>
<td>Students make notes on steps to follow for construction and use recycled materials and required items outlined in their planning to create their classroom design.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>An exhibition is held to display designs and students evaluate their own and others work by completing the self and peer assessment sheets provided in their design folio.</td>
</tr>
</tbody>
</table>

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>CLO</th>
<th>Learning Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics (Length, mass, area and volume)</td>
<td>M 4.1 Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.</td>
<td>Students investigate important math’s tools and appropriate content for Yr two level. They use mathematical skills when sticking to the budget, and use measurement to work with the parameter and scale of the design and its features.</td>
</tr>
<tr>
<td>The Arts (Visual Art)</td>
<td>VA 4.2 Students make and display images and objects, considering purposes and audiences.</td>
<td>Students use art to design and construct images and objects that portray their design ideas</td>
</tr>
<tr>
<td>SOSE (Systems Resources &amp; Power)</td>
<td>SRP 4.2 Students plan and manage an enterprise that assists a community or international aid project.</td>
<td>Students investigate, plan and create a design that targets Yr 2’s needs for their classroom.</td>
</tr>
<tr>
<td>HPE (Enhancing Personal Development)</td>
<td>EPD 4.1 Students evaluate the influence on self concept and self-esteem of their own and others’ behaviours, including recognition of achievement and changes in responsibilities.</td>
<td>Students investigate what Yr 2 would like to make them feel happy and enhance learning in their classroom.</td>
</tr>
</tbody>
</table>

Assessment Ideas:

<table>
<thead>
<tr>
<th>ASSESSMENT TECHNIQUE</th>
<th>Anticipated Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>FORMATIVE: Observation Focused analysis Rubric</td>
<td>Anecdotal records used to make judgments of students brainstorming and sharing ideas. Teacher to collect design folios at end of each design process (investigation, ideation, production) to make judgments on how the learning is progressing. Criteria sheets provided in their design folio to be explained and modeled outlining key indicators for each stage of the design process.</td>
</tr>
<tr>
<td>SUMMATIVE: Observation Focused analysis</td>
<td>Key indicators from rubric to be used to evaluate final designs during observation at gallery walk/exhibition Self and peer assessment sheets provided in the design folio to be collected by teacher for analysis.</td>
</tr>
</tbody>
</table>
Context:
School: Students conduct interviews to research the interests and needs for a ‘fun and educational’ classroom.
Business: Students investigate if their designs and ideas are cost effective and realistic.
Personal: Students will consider their own needs and interests as well as the needs and interests of young children when designing the classroom.
Leisure / Recreational: Students will consider the importance of creating a classroom that will interest young students through designing activities that are centred around their interests.

Appropriateness:
During the design and development of their model, children will consider and evaluate the appropriateness aspects of their design.
Functional: Does the classroom meet the parameters?
Aesthetic: Is the design suitable for a year 2 classroom and is it realistic?
Economic: Has the design been constructed using affordable materials?
Environment: Has the design been constructed using recycled materials?
Social: Does the design encourage year two students to want to learn?
Does it make a positive schooling experience for the students each day?
Cultural: Does the design consider cultural diversity for its task?

Resources:
The budget for this design is $10.00. A wide variety of resources that are recycled materials and materials already available in the classroom can be used. Recycled products include: chipboard, nails, plastic CD covers, carpet, magnets, scrap paper, string, cardboard box, newspaper pictures, laminate, sticky tape, paint, sand, shells, decorative items. The following items were bought and allowed for in the $10.00 budget: material scraps, wrapping paper, pipe cleaners, and cotton balls.
Students also use human resources to obtain advice with their designs e.g. Professionals such as builders, teachers, other Yr 2 students

Management:
<table>
<thead>
<tr>
<th>People</th>
<th>Students will work in pairs, gaining valuable interpersonal skills. They will work collaboratively through their design folios sharing ideas, working safely, negotiating tasks and communicating effectively.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources</td>
<td>Students will discuss, negotiate and plan the use of resources that results in a minimization of waste, shows efficiency of process and effectiveness of product.</td>
</tr>
<tr>
<td>Opportunities</td>
<td>Students will show enterprising qualities by being creative and innovative in their designs. They will work co-operatively to review and assess their work. Students will consider time management by planning and setting goals for each part of the design process. Students will work within a given budget, creating an awareness of financial implications.</td>
</tr>
<tr>
<td>Constraints</td>
<td>Students will work within a given budget and set parameters to complete their design. They must also complete their design within the given time frame and follow the process outlined in the design folio. Students must consider the needs and requirements of the Yr 2 students and teacher in their design.</td>
</tr>
</tbody>
</table>
Design Challenge: Solar Smart Spectacular

A major concern in life today is the limited resources that we all use. Without these resources we cannot live a life that we all want. We would not have luxuries that we all enjoy, like hot water. As the sun is a renewable resource (that is, it can never be used up), it is an excellent tool to be used to heat up water. However today’s leading scientists are having trouble coming up with a design that works, is environmentally friendly, made out of cheap recyclable material and is appealing to look at. So the Institute of World Scientist challenge you to come up with a practical design that you can enter into the ‘Solar Smart Spectacular’ world competition. There are certain conditions of entry, such as you must use recyclable products and spend no more than $10 on items, plus it must not only look fantastic, but it has to work. Only one winner will be chosen and that group of children will win an all expenses paid trip to ‘Disney Land’!!! So it’s all in your hands........Put your thinking caps on and Get Solar smart!

Outcomes, Levels and Strands:
Technology Practice -
TP4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP4.2 Students generate ideas through consultation and communicate these in detailed design proposals.
TP4.3 Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
TP4.4 Students gain feedback to gauge how effectively their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information -
INF4.1 Students analyse sources and forms of information and match these to their requirements of design challenges.

Materials -
MAT4.1 Students explain how characteristics of materials affect ways they can be manipulated.

Systems -
SYS4.1 Students identify and explain the logic of systems and subsystems.

Activities:
Investigation - Students research various designs of solar hot water systems using the Internet, magazines, newspapers, journals, brochures and human resources. Students brainstorm, research and then look for recyclable materials that are cheap and that absorb heat and can be used for their design projects. In one lesson, a spokesperson from the Gold Coast City Council who is an expert in solar energy, will speak to the children and answer any questions that they may have regarding solar energy.

Ideation - Students start to brainstorm and combine their information gathered from research to think of a few designs that meet the criteria being assessed. Students will then summarise their ideas and decide which are the best materials to use and will then start to sketch their design. Then the students start to collect the recyclable materials from local scrap piles, dumps and hardware stores. Students must take into consideration the $10 budget and the size of their design.

Production – After writing a plan, students now start to construct their design in groups and individually. Students also take into account safety procedures that they should follow when using certain tools. Therefore students are allowed adult input and supervision. During the production students undergo trial and error processes to the original design by making modifications where necessary.

Evaluation - Students will test the effectiveness of the solar hot water system outside in sunny conditions. They will evaluate the appropriateness of their design and make sure that they have stuck to the initial design requirements. Students also record the difficulties and problems that arose during the production process. Students then present their design to the class highlighting the materials, characteristics and justifications of their solar hot water system.

Teaching Strategies –
• Creating a supportive and positive classroom environment for students
• Allow students to have a hands on learning environment
• Develop in students the ability to work with others.
• Develop certain attitudes in students such as open mindedness, critical inquiry, objectivity and rationality
• Involve the students in practical work using simple, inexpensive and unsophisticated equipment and materials.

Crosscurricular Learnings:
This unit may also encourage students learning in the follow key learning areas:

English - Writing reflections of their own design, keeping written diaries of the different stages in the design challenge and taking notes from guest speakers.

Mathematics - Drawing of 2D design ideas, measurement for restricted size, estimation of cost, calculating and working with a money budget.

Science - Students discuss the environmental factors of solar heating, how it works, the community benefits and the use of recyclable materials.

SOSE - Research on solar heating and the benefits of the use of such products around the world, students could visit local factories or businesses that use solar energy, guest speakers that specialise in recyclable energy use.

The Arts – Being creative in design aspects, painting, drawing, sketching, colour, etc.

Assessment Ideas:
✓ Observing and questioning student participation in group work and in the final presentation (Checklists)
✓ Taking anecdotal notes throughout the process (individual)
✓ Teacher- student interviews throughout the entire assessment
✓ Peer assessment (Criteria sheets) and Self assessment (Personal reflections)
✓ Project folio of completed work (includes pictures taken throughout each process.)
Context:
*Business* - Students consider the factors encountered when marketing their designs, for size and council approval. 
*Communities* - Students consider if the design of their systems would suit the environmental crisis, and if it will meet the needs of families and businesses from surrounding communities. 
*Global* - Through the research of water systems from around the world, students gather information on different designs that suit different climatic conditions. 
*Home and Family* - Students consider the thoughts of friends and family and how they would conduct the use of a hot water system within their own home. 
*Personal* – Students will gain personal satisfaction from constructing a design that interests them, communication, problem solving and critical thinking skills. 
*School* - Students realise the importance of hot water systems and the need for environmentally friendly alternatives. 

**Appropriateness:**
*Functional* – The students will work within specific constraints and use recyclable materials that meet specific purposes and then evaluate if the goal of the assessment is achieved.  
*Aesthetic* – Students consider the target audience and assess if the model is visually appealing? Why were the colour/s chosen?  
*Economic* - Students will work within a budget to meet the cost constraints. 
*Cultural* - Students will assess whether there are design parameters that can affect cultural sensibilities such as its shape or positioning? 
*Environmental* - Does the production of the components outweigh the environmental benefits of the final product? 
*Ethical* - Does the design solution solve the environmental problem or is it just another product for the sales market? 

**Resources:**
- Stanley knife, drill, pliers, ruler, pencil, water, thermometer, screws, wooden board, black spray paint ($2.50), plastic container, rubber tubes ($4), drop saw, silicon, aluminum/ alloy and off cuts of metal. 

**Management:**
*Managing people* - Students will need to work cooperatively, within small groups and each individual shares their own opinions and ideas. The class will have to be closely monitored for safety percussions. This design task allows parental supervision for the use of power tools. 
*Managing resources* – Students have access to similar materials that stay within the budget constraints. The materials are recyclable and are available from school or home. It should be discussed what materials are suitable. 
*Managing opportunities* – Students should be encouraged to be creative and use their imaginations. They will learn problem solving and decision making skills that will help them achieve a final product. Students will learn to negotiate ideas and be flexible with their own suggestions. They will also learn that things don’t always go to plan and that compromises have to be made. 
*Managing constraints* – Students will have a time limit for their designs and they will learn to acquire time-management skills. Students also need to be aware of cost budgets and find a way to complete their design in the most cost effective manner. They also need to meet design criteria and the target audience.
Due to the population boom on the Gold Coast, it has been brought to the Gold Coast City Council's attention that a more effective parking system needs to be implemented to counter the heavy congestion of streets. The GCCC has approached your school to ask for your assistance in designing a new parking solution that will solve the increasing parking problems.

### Outcomes, Levels and Strands

<table>
<thead>
<tr>
<th>Technology Practice</th>
<th>TP3.1: Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TP3.2: Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.</td>
</tr>
<tr>
<td></td>
<td>TP3.3: Students co-operatively develop and follow production procedures to make products that reflect their design ideas.</td>
</tr>
<tr>
<td></td>
<td>TP3.4: Students test and judge how effectively their own and others processes and products meet the design challenge.</td>
</tr>
<tr>
<td>Information</td>
<td>INF3.2: Students select and use techniques for generating, modifying and presenting information for different purposes.</td>
</tr>
<tr>
<td>Materials</td>
<td>MAT3.1: Students choose materials according to various characteristics that best suit the product and user.</td>
</tr>
<tr>
<td></td>
<td>MAT3.2: Students select and use suitable equipment and techniques to combine accurately in order to meet design requirements.</td>
</tr>
<tr>
<td>Systems</td>
<td>SYS3.1: Students identify and describe relationships between inputs, process and outputs in systems.</td>
</tr>
<tr>
<td></td>
<td>SYS3.2: Students assemble and trial systems they design by considering inputs, processes and outputs.</td>
</tr>
</tbody>
</table>

### Activities

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Students conduct surveys to investigate possible ideas to solve the current parking dilemma. Findings should be recorded in Design Portfolio. Students use resources such as internet, books, surveys, community organisations etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ideation</td>
<td>Students will develop a design portfolio, where evidence of investigations are to be recorded. The portfolio can include sketches, plans, photos, video, a journal of development, interviews and any resources used to create ideas.</td>
</tr>
<tr>
<td>Production</td>
<td>Students will work together in groups of 3-4 to brainstorm ideas and plan their design/model.</td>
</tr>
<tr>
<td></td>
<td>Students will agree on a variety of resource and materials that will be of use in the construction of their final product.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>The final built product will be presented by the same group of students orally and through the use of PowerPoint. The presentation must be persuasive to influence their audience’s decision towards their design challenge construction.</td>
</tr>
<tr>
<td></td>
<td>In addition, the presentation must include and explain their process of working technologically (eg. Investigating, ideating, producing and evaluating) to construct a design solution.</td>
</tr>
<tr>
<td></td>
<td>After the presentations, students are asked to evaluate their own and others’ solutions for positives and negatives and also provide reasoning.</td>
</tr>
<tr>
<td></td>
<td>As a class, the students will discuss their evaluations of one other and decide upon a final product which provides the best solution for the design challenge.</td>
</tr>
</tbody>
</table>

### Assessment Ideas

<table>
<thead>
<tr>
<th>Assessment Technique</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Observation of group co-operation and participation in regards to the production of design.</td>
</tr>
<tr>
<td>Consultation</td>
<td>Design portfolio – record of meetings, research, interviews, surveys etc.</td>
</tr>
<tr>
<td>Focussed Analysis</td>
<td>PowerPoint presentation (persuasive oral)</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>Peer assessment sheets and discussion on pro’s and con’s of presentations and ideas.</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>Self assessment sheets/journal entries.</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>Design portfolio and final product.</td>
</tr>
</tbody>
</table>

### Resources

Students can source and use a variety of resources and materials. These materials may include: glue, cello-tape, cardboard, boxes, paint, natural resources i.e. grass, leaves sticks etc, Items from home i.e. toy cars, old CDs etc.

### Management

**Managing People:** Did the students complete the design challenge by working individually and collaboratively? Did they produce their design whilst being aware of safety issues?

**Managing Resources:** Did the students use their resources to the best of their ability, to end up with a polished final product?

**Managing Opportunities:** Did the students assist Gold Coast City Council in providing solutions that are suitable to its context as the tourism capital of Australia, ensuring that the solution is cost-effective and easy for people of all nationalities and abilities to use?

**Managing Constraints:** Did students complete their design in the timeframe allowed and was the project completed within size and budget constraints?
Crosscurricular Learnings

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcome</th>
<th>Proposed Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>VA3.2: Students make and display images and objects, understanding the function of informal and formal display.</td>
<td>Students use a variety of materials to construct their model.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students work in groups to prepare a presentation which includes an explanation of their model and reasons for their design choice.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consider the aesthetic aspects of their design.</td>
</tr>
<tr>
<td>English</td>
<td>CU3.2: When reading and viewing, students will select texts for own reading and viewing purposes using knowledge of text types; interpret subject matter by making connections between directly stated information to identify main ideas and supporting details; make some inferences about characters from directly stated descriptions and actions identify aspects of the text that indicate the author considered the interests of the audience.</td>
<td>Students use a range of texts including books, internet and other resources to research different ideas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Students record all ideas, mind maps, drawings and reflections in a development journal.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oral Presentation.</td>
</tr>
<tr>
<td>HPE</td>
<td>PH3.3: Students identify potentially hazardous situations and demonstrate actions to respond to unsafe and emergency situations.</td>
<td>Work co-operatively in groups.</td>
</tr>
<tr>
<td></td>
<td>PD3.4: Students demonstrate communication, operation and decision making skills to collaborate in social, team or group situations.</td>
<td></td>
</tr>
<tr>
<td>Maths</td>
<td>M3.1: Students identify and use equivalent forms of standard units when measuring, comparing and ordering and estimate using a range of personal reference.</td>
<td>Students estimate the cost of their model and also take into account the approximate cost of real-life application of design.</td>
</tr>
<tr>
<td></td>
<td>Model of design is built to scale.</td>
<td></td>
</tr>
<tr>
<td>SOSE</td>
<td>SRP3.3: Students apply the principals of democratic decision-making in co-operative projects.</td>
<td>Through research and design students work in groups to construct a model of a parking solution and describe why it is appropriate and helpful to the community.</td>
</tr>
<tr>
<td></td>
<td>SRP4.2: Students plan and manage an enterprise that assists a community or international aid project.</td>
<td></td>
</tr>
</tbody>
</table>

Context

Community:
Students will have to consider what the community values in regards to Gold Coast parking, taking into consideration all members of the community, including those with special needs. Students should offer appealing parking features and these features should be as user friendly as possible.

School:
As valued members of the community upper primary school children are aware of the needs of a changing society in order to create a workable design.

Home and Family:
Students will consider the needs of families and the community, offering features that appeal to families.

Business:
Students are required to promote their system in a professional manner.

Leisure and Recreation:
The parking system should be stress free and promote and enable the community to participate in typical Gold Coast leisure activities.

Appropriateness

Functional:
Is the parking solution suitable for its intended use?

Aesthetic:
Is the parking solution aesthetically pleasing? Does it blend in with surrounding infrastructure?

Social:
Does the product consider people of all ages, physical abilities and modes of transport?

Economic:
Is the intended parking solution economically viable?
Land Yacht - Danielle Whalan

**Design Challenge: Land Yacht: a new eco-friendly base model for 007**

James Bond, this is M. As the world’s oil sources dry up, the hunt is on to find new eco-friendly alternative energy. Your mission, should you choose to accept it, is to help build a new method of on-land travel for yourself. Should this model be successful, we will further develop it, and incorporate the necessary components to facilitate your next operation. For now, we need your help and expertise of fine vehicles to create the future of the 007’s travel using alternative energies. Oh, and James, do try to be careful with this one!

Special considerations: must cost less than $10, and must be no larger than 45x45x30cm.

**Year Level:**
This design challenge is intended for grade 5 students, utilizing Level 3 of the QSA Syllabus.

**Outcomes, Levels and Strands:**
- **TP 3.1** Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
- **TP 3.2** Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
- **TP 3.3** Students test and judge how effectively their own and other’s processes and products meet the design challenge.
- **INF 3.1** Students describe advantages and disadvantages for different sources and forms of information.
- **MAT 3.1** Students choose materials according to various characteristics that best suit the product and user.
- **MAT 3.2** Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
- **SYS 3.1** Students identify and describe relationships between inputs, processes and outputs in systems.
- **SYS 3.2** Students assemble and trial systems they design by considering inputs, processes, and outputs.

**Activities:**

<table>
<thead>
<tr>
<th>Investigation</th>
<th>Ideation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Students examine existing forms of land vehicles, and alternative energies to discover appropriate blends of the two. Students seek previous attempts at this challenge to guide their concepts.</td>
<td>- Students generate sketches and notes to assist in deciding upon an appropriate design.</td>
</tr>
<tr>
<td>- Students analyse areas that require further research using a KWL system. Students analyse demands of vehicles reliant upon alternative energies. Students compare benefits and disadvantages of energies. Students will be encouraged to think of wind, but are welcome to investigate other means.</td>
<td>- Students communicate within the class regarding technical difficulties, ideas, and design elements.</td>
</tr>
<tr>
<td>- Students gather a bank of knowledge on alternative energies, the arguments for and against these, from a range of sources. Students also begin to compile ideas as to how this challenge may be accomplished.</td>
<td>- Students plan a method, or system of production. Students also plan strategies to conquer specific challenges within the design (moving parts). This information becomes part of each student’s folio, as evidence of brainstorming. Students also plan their resources and time management, to ensure that the task is completed within the parameters of the design challenge.</td>
</tr>
<tr>
<td>- Students research specifically on vehicle design, alternative energies, and hybrids that combine the two. Students conduct this research through books, journals, magazines, museums, and the internet.</td>
<td>- Students design more comprehensive sketches, and notes for construction, with light given to the challenges overcome. Students make particular reference to the moving parts of the vehicle, with particular attention to how the vehicle will operate using alternative energy.</td>
</tr>
</tbody>
</table>

**Production**

<table>
<thead>
<tr>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Students test the effectiveness of their craft. If appropriate, they may also alter the structure (changing sails) to enhance natural phenomenon (wind).</td>
</tr>
<tr>
<td>- Students judge the most efficient yacht as a class, with a race of all yachts to be the crucial factor. Students will also consider and appreciate innovation, interesting use of materials, aesthetics, and attention to task.</td>
</tr>
<tr>
<td>- Students reflect upon the success of their land yacht. Students should note elements that they found played to their strengths or otherwise. Students should also take time to reflect upon their peers’ work.</td>
</tr>
<tr>
<td>- Students compare models with a gallery walk that also notes the statistics of the vehicle (cost, speed in race, special features). From this exercise, the class will nominate the most desirable 007-mobile.</td>
</tr>
</tbody>
</table>

**Crosscurricular Learning:**

<table>
<thead>
<tr>
<th>KLA Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>English</strong></td>
</tr>
<tr>
<td><strong>Maths</strong></td>
</tr>
<tr>
<td><strong>HPE</strong></td>
</tr>
<tr>
<td><strong>SOSE</strong></td>
</tr>
<tr>
<td><strong>Science</strong></td>
</tr>
</tbody>
</table>
Assessment Ideas:
Students would be assessed through a range of mediums for this design challenge. There would be opportunity to plan and journal thoughts individually, and as a pair/group. Think-pair-share ideas will help overcome difficulties, as well as provide assessable opportunities. The scheduling of completion gives progress-tracking prospects. Chances for students to self-assess should be implemented at various stages (for instance, when re-checking their designs against the parameters of the design challenge). Students are encouraged to talk freely and informally regarding their model. Students are also required to list key features of their design to present with the finished piece. All activities will lead to a race of final products, which will subsequently follow into a discussion of the positive attributes of each design. Assessment relies upon anecdotal notes, consultation, and observation, together with more formal and structured assessment.

Context:
Personal - Students learn to think creatively as they develop ideas and strategies individually and collaboratively. This process enhances group behavior skills, particularly listening and cooperation.
Community - Students' designs will reflect the lifestyle they experience and will therefore be appropriate to the wider Gold Coast, Queensland, and Australian audiences, with possibilities to reach the world.
School - Students work in teams. That enhances relationships between peers, and also between teachers and students.
Leisure and Recreation - Students are to design a vehicle that could ideally be used for not only James Bond, but for everyday transport usage.
Business - Students realise that their prototype may be inspiration for actual fuel-free vehicles and are therefore marketable.
Industry - Students will become aware that this new-wave thinking will change the vehicle industry and potentially other industries.
Economical - Students should be mindful of the cost of their venture, and also the greater economical impact their design might have for industry.
Environment - Students' designs are environmentally encouraging, and address issues such as alternative energies, recycled materials, and sustainability.

Appropriateness:
Aesthetic - Students will create a land yacht that appeals visually to the eye, as they see fit. Students may wish to consider current vehicle looks as inspiration for their model.
Cultural - Students consider the cultural needs associated with this vehicle, for instance, the need for larger seating.
Economic - Students look for cost effective methods to produce a quality model of their desired craft.
Ethical - Students may design a vehicle that is accessible to all people, including those with disabilities.
Functional - Students' design a working craft that is able to move with use of alternative energies.
Social - Students' designs are socially mobile, allowing a wider audience to participate with their design.

Resources:
Resources for this challenge include information resources such as books, journals, magazines, and the internet that are readily available from public outlets such as libraries. Students are encouraged to use recycled materials to complete this task, which include but are not limited to cardboard, bottle tops, fabric swatches, plastic bags, wrapping paper, old toys, and string. For aesthetic purposes, paint and colored markers/ pencils are used. Similarly, coloured paper, crepe paper and cellophane could also be used to achieve this assessment. Resources typically desired for this task, are mostly available from school supplies. The modeled car was made from shoe boxes, straws, sticky tape, cardboard, CDs, and a calico bag. The only purchased equipment was the straws. (Blue under frame of car, and green holding sail). Straws cost a total of $3.80.

Management:
Managing people - Students manage their involvement individually, in pairs, and as a group. Students consider safety, and limitations for themselves and their peers. This also applies as students test their models.
Managing resources - Students are mindful to share resources between them. Students also strive to use recyclable materials where appropriate. Students are also aware of shared space for all groups.
Managing opportunities - Students are aware of opportunities to develop their designs, and are willing to incorporate suggestions made by others to better their designs. Students also take opportunities to participate with their design, and that of others.
Managing constraints - Students adhere to the limitations of the design challenge. They uphold the integrity of the task by regularly checking that their design applies to the parameters.
The Surfer Buddy - Amy Williamson and Zoe Wagland

Design Challenge: The Surfer Buddy

Good morning class,
My name’s Sandy Grain and my family and I have just moved from way out in the outback near Woolenmagatta to the Gold Coast. We’ve never been to the beach, just seen it on Home and Away. They always talk about surfing and we'd really love to give it a go, but we don't have the confidence to go out in the water with just a regular surf board. I'd love it if my classmates would design and make a model of a surfboard that would help my family and I to become brave enough to face the wild whirly water! Good luck with this challenge, I look forward to seeing what ideas you all have!
Thanks for listening,
Sandy

Technology Levels, Outcomes & Strands

Technology Practice:
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Students identify and make use of the practical expertise of others when following production procedures to makes products for specific users.
TP 4.4 Students gather feedback to gauge how effectively their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Information:
INF 4.1 Students analyse sources and forms of information and match these to the requirements of design challenges.
INF 4.2 Students apply techniques for transforming and transmitting information for different audiences.

Materials:
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.
MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their product.

Systems:
SYS 4.1 Students identify and explain the logic of systems and subsystems.
SYS 4.2 Students incorporate feedback to refine and modify systems and/or subsystems.

Activities

Investigation
- Students use T-charts and mind maps to draw upon prior knowledge
- Students research from internet, Surf Life Saving Club open days, library, etc. and analyse current surfboards on market
- Students invite pro surfer to classroom to discuss surfing background
- Students brainstorm quirky alternatives to the traditional design
- Students design and distribute surveys to general public on their experience, needs & wants regarding surfing
- Students investigate the pros and cons of various materials using a PMI chart to see what would be most appropriate for the design challenge
- Students research options for motored surfboard, eg. Propeller, solar-powered

Ideation
- Students document their own ideas to put towards portfolio
- In groups students use think, pair, share activity to express ideas
- Students identify various means of advertising that would be most suitable for their chosen product
- Students create their advertising campaign through brochures, newspaper articles, television ads, power point presentations, etc
- Students hold a morning tea for parents to allow the students to receive feedback which they must take note of when refining their systems
- Students and teacher collaboratively create checklist for use when evaluating peer design challenges at Display Evening

Production
- Students go on excursion to surfboard making factory
- Students use ideas and information gathered to create their design product
- Students create sketch to provide visual image of completed design product
- Students write a list of materials and proposed cost of manufacturing product
- Students delegate materials to be collected between group members
- Production begins and students ensure they have met design and budget requirements

Evaluation
- Students organize a Display Evening to showcase their design challenges to parents and peers
- Students present design challenge at Evening by using their preferred advertising method
- Students use checklist to evaluate other design challenges and observe whether they meet all criteria and whether the product works
Assessment

<table>
<thead>
<tr>
<th>Technique</th>
<th>Recording Tool</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>- Anecdotal records</td>
<td>- students' level of participation, degree of enthusiasm towards the design challenge, interaction with peers during group work</td>
</tr>
<tr>
<td>Consultation</td>
<td>- Anecdotal records</td>
<td>- teacher takes note of students' progress through discussion about the design challenge</td>
</tr>
<tr>
<td>Peer Assessment</td>
<td>- Checklist</td>
<td>- students refer to checklist when evaluating their peers' work</td>
</tr>
<tr>
<td>Self Assessment</td>
<td>- Journal</td>
<td>- students record journal entries detailing their thoughts, feelings, opinions and progression throughout the challenge</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>- Portfolio</td>
<td>- all students’ work (journal, pictures, info, sketches) are evaluated by the teacher and parents on the Display Evening</td>
</tr>
</tbody>
</table>

Crosscurricular Learnings

<table>
<thead>
<tr>
<th>KLA; Strand, Level &amp; Outcome</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>- Students develop literacy skills through the writing &amp; speaking of a script for the commercial</td>
</tr>
<tr>
<td>- Speaking &amp; Listening Cu4.1, Cr4.1</td>
<td>- Students develop written skills through the written components on their Power Point</td>
</tr>
<tr>
<td>- Writing &amp; Shaping Cu 4.3</td>
<td>- Students develop visual art skills when painting surfboard</td>
</tr>
<tr>
<td>- DR 4.2</td>
<td>- Students develop drama skills through acting in commercial</td>
</tr>
<tr>
<td>- VA 4.2</td>
<td>- Students research the popular sport of surfing to encourage their audience to participate</td>
</tr>
<tr>
<td>The Arts</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
<tr>
<td>HPE</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
<tr>
<td>- DCSPA 4.4</td>
<td>- Students measure the dimensions of the surfboard to work within the size constraints</td>
</tr>
<tr>
<td>SOSE</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
<tr>
<td>- PS 4.1</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
<tr>
<td>Mathematics</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
<tr>
<td>- M4.1</td>
<td>- Students develop SOSE skills when researching the impact motors (for the propeller) have on the environment</td>
</tr>
</tbody>
</table>

Contexts

Personal: The Surfer Buddy will build a person's fitness, confidence in the surf and allow for more social interaction.

School: The surfing subject is present in some school curriculums and would enable more children to be active and involved in this healthy sport.

Community: The Surfer Buddy will open up opportunities for more enrolments in Surf Life Saving Clubs as children will be more confident in the surf and therefore themselves.

Leisure & Recreation: Due to surfing being a popular leisure activity on the Gold Coast, the Surfer Buddy will encourage more to spend more time outdoors, in particular at the beach.

 Appropriateness

Aesthetic: Students take into consideration the effect of shape, colour, material and texture will have on their Surfer Buddy as work to a scale due to space constraints. These need to have a sensory appeal for perspective buyers.

Cultural: Students use research to recognize the various groups and subcultures in their community and draw upon needs and requirements when considering their product.

Economic: Students investigate the proposed costs to construct their design challenge. They do this by brainstorming possible material, labour and time costs. Students are encouraged to use recyclable materials for their project to reduce unnecessary costs.

Environmental: Students need to investigate different methods of providing power to the Surfer Buddy that will be environmentally friendly and consider the impact their product will on the consumers. Materials used to create this product should aim to reduce the environmental impact associated with the design development and product use.

Functional: Students need to research the demand for this product (through community surveys) to determine the sustainability on the market.

Social: The Surfer Buddy opens avenues for women and girls, in particular, to gain confidence and establish their role within a usually male dominated sport.

Resources

- chicken wire $4
- pliers
- newspaper
- clag glue & water
- paint & brushes
- toy propeller
- rope
- straws
- rubber mat
- aluminum foil
- cardboard
- video camera
- camera
- wire
- cheese container
- black marker
- sticky tape
- sparkler
- scissors
- stubby holder

Management:

Managing people

- Students are required to work collaboratively, share equipment, working space and negotiate and designate tasks for completion of product.

Managing resources

- Students prioritise the use of recycled materials and take control of their own learning through the choice and evaluation of their chosen materials.

Managing opportunities

- Students learn planning, marketing strategies and enterprising skills that will give maximum impact on their ideas when presenting to a business.

Managing constraints

- Students need to work within constraints such as time, budget and needs of their targeted audience.
The Rain, Hail or Shine Clothesline - Amanda Knight and Louise O’Grady

Design Challenge: The Rain, Hail or Shine Clothesline
Mum and Dad are stuck! When clothes are out on the clothes line it always seems to rain. Although mum and dad are at home they still never seem to have enough time to get all the clothes in before it becomes really heavy. Other times the clothes aren’t dry enough to bring inside and require longer drying time. Mum and Dad have asked for you to come up with a design to solve their problem and stop them from getting wet by having to run out in the rain to get the clothes in. You have a budget of $10 to create your design.

Outcomes, levels and strands
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
INF 3.1 Students describe advantages and disadvantages of different sources and forms of information.
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.

Activities:

<table>
<thead>
<tr>
<th>Investigating</th>
<th>Ideating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students begin by researching the history of the clothesline including where it originated from and who invented it.</td>
<td>Students will take into account the needs of their community members to design a functional drying clothesline which prevents people from getting wet.</td>
</tr>
<tr>
<td>Students investigate different designs of clotheslines within their neighbourhood.</td>
<td>Students take into account the answers from the questionnaires which were previously distributed.</td>
</tr>
<tr>
<td>Students create a questionnaire about community members clotheslines. The questionnaire should aim to learn what exactly what they want from their clothesline.</td>
<td>Students collaborate ideas in groups of 4 including ideas about materials, costs and design.</td>
</tr>
<tr>
<td>Producing</td>
<td>Evaluating</td>
</tr>
<tr>
<td>Students will take into account the needs of their community members to design a functional drying clothesline which prevents people from getting wet.</td>
<td>Students will be required to have evidence of constant evaluations throughout the design process.</td>
</tr>
<tr>
<td>Students take into account the answers from the questionnaires which were previously distributed.</td>
<td>Students will be given an evaluation questionnaire whereby they will have to evaluate their final design in comparison to other students’ products.</td>
</tr>
<tr>
<td>Students experiment and grasp an in depth understanding of a pulley system and how it functions.</td>
<td>Students will research different clotheslines from around the world.</td>
</tr>
<tr>
<td>Students will be required to have evidence of constant evaluations throughout the design process.</td>
<td>Students will also become familiar with the history of the clothesline and other relevant information.</td>
</tr>
<tr>
<td>Students will be required to have evidence of constant evaluations throughout the design process.</td>
<td>Students will design an aesthetically pleasing scale model which adheres to the design constraints.</td>
</tr>
</tbody>
</table>

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Outcome</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maths</td>
<td>M3.1 students identify and use equivalent forms of standard units when measuring comparing and ordering, and estimate using a range of personal referents.</td>
<td>Students will be required to budget and work to a scale. Students will also estimate the length of resources and time constraints.</td>
</tr>
<tr>
<td>English</td>
<td>OP 3.1 when speaking students use logical sequence when organising ideas, use stages of generic structure, patterns of clauses, text connectives, conjunctions, and specialist words according to the text type and medium, use statements, questions and commands to generate and maintain discussions and conversations, use processes and attributes that offer opinions.</td>
<td>Students will use diary entries and questionnaires throughout the design challenge.</td>
</tr>
<tr>
<td>Science</td>
<td>EC 3.1 Students collect data and make and test inferences to describe the effects of forces on the motion and shapes of objects.</td>
<td>Students experiment and grasp an in depth understanding of a pulley system and how it functions.</td>
</tr>
<tr>
<td>SOSE</td>
<td>PS 3.5 students describe the values underlying personal and other people’s actions regarding familiar places. TCC 3.1 students use evidence about innovations in media and technology to investigate how these have changed society.</td>
<td>Students will research different clotheslines from around the world. Students will also become familiar with the history of the clothesline and other relevant information.</td>
</tr>
<tr>
<td>Arts</td>
<td>VA 3.2 students make and display images and objects understanding the functions of informal and formal display</td>
<td>Students design an aesthetically pleasing scale model which adheres to the design constraints. Students will produce a sketch during the Ideating phase of development.</td>
</tr>
</tbody>
</table>

Assessment Ideas:
Observation: observe how the students work in groups and contribute equally to the task. Students will need to present their journals at the completion of the task.
Consultation: teacher is an available resource for students throughout the design challenge.
Focused analysis: using the surveys and written material provided by students, teachers will be able to assess the depth of research used to create the design.
Peer and Self Assessment: students will be able to assess their own work and provide feedback to their peers regarding their designs.

Context:
Home and family: use within the home. This design is time efficient and prevents having to dry clothes in a dryer.
Community and global: this clothesline is environmentally friendly and is cost effective in reducing the electricity used by a dryer.

 Appropriateness:
Aesthetic: does the design fit into the household aesthetics? E.g. colour schemes, home design. Is the design space effective?
Functional: does the design function to an acceptable standard?
Economic: will the design be available to different socio-economic groups within the community?
Environment: are the materials used for the design environmentally friendly?

Resources:
Ply timber: $4.95
Paints: household items
Scrap booking material: household items
Paddle pop sticks: household items
Wire: $2.00
Plastic: Household items

Management:
Managing people
• Students will work together in a cooperative manner.
Managing resources
• Each student will collect household resources as well as be able to access classroom resources e.g. paint and glue.
Managing opportunities
• Each group will be designated a time bracket within the school day to access classroom resources so that each group has equal opportunities.
Managing constraints
• Students must submit the work within the designated timeframe. They must adhere to the size constraints of 450mm x 450mm x 300mm. students must also stay within a $10 budget.
The Ultimate Penguin Playpen - Glenys Fraser and Jenna Battye

Design Challenge: The Ultimate Penguin Playpen
The penguin enclosure at Seaworld has been forgotten and neglected. Seaworld has approached local schools to design a new enclosure. The winning students will receive free entry into Seaworld for a year. Our challenge is to design a new environmentally friendly enclosure in keeping with the theme of a natural environment. The criteria includes a minimum of 5 features: modern, realistic, aesthetically pleasing, self-sufficient and educational. Maximum size constraints 450mmx450mmx300mm. Cost $10 (max).

Outcomes, Levels and Strands:
Technology Practice:
TP3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP3.2 Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP3.4 Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Information:
INF3.1 Students describe advantages and disadvantages of different sources and forms of information.
INF3.2 Students select and use techniques for generating, modifying and presenting information for different purposes.
Materials:
MAT3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Activities:

<table>
<thead>
<tr>
<th>TP3.1 Investigation</th>
<th>In groups of 4-5 students research and gather information from various sources e.g., Internet, library, marine biologists or other professional people, magazines, brochures to find out about the Fairy penguin’s habitat and natural daily requirements.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- Whole class brainstorm about the information that is relevant or specific to the design challenge.</td>
</tr>
<tr>
<td></td>
<td>- Whole class collaborate ideas about what is needed for survival of the penguin</td>
</tr>
<tr>
<td></td>
<td>- All students record issues in a ‘design diary’ to add to their portfolio.</td>
</tr>
</tbody>
</table>

| TP3.2 Ideation      | Groups of 4-5 present their ideas to the class about what is needed in the design challenge in 2D form. Explain in the presentation what, how and why they have selected the materials and tools used. Whole class discusses advantages and disadvantages of each design and modify plans for a final design that will be produced. |

| TP3.3 Production    | Whole class will identify, describe and sequence the steps, materials and assistance they will require to produce the new enclosure. Each group will be given a task such as researching costs of materials, availability of materials, people to assist with manufacture and what recycled material are available. Whole class is involved in producing the final ‘Penguin Experience’. |

| TP3.4 Evaluation    | Students complete a self-reflection log. Groups will submit a group reflection on their contribution to the overall design challenge. Whole class will present the final product for entry into the competition. This would be a powerpoint, model, or written and oral presentation to explain the features and how the enclosure has met the design challenge criteria. |

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>STRAND, LEVEL &amp; OUTCOME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Op 3.1 – Speaking &amp; Listening. Students use logical sequence when organizing ideas. Use statements, questions and commands to generate and maintain discussion ad conversations. Use their knowledge of the stages of generic structure to identify text type and purpose.</td>
</tr>
<tr>
<td></td>
<td>M3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
</tr>
<tr>
<td></td>
<td>N3.2 Students identify and solve addition and subtraction problems involving whole numbers and decimal fractions in context selecting from a range of computation methods, strategies and known number facts.</td>
</tr>
<tr>
<td></td>
<td>PS3.2 Students create and undertake plans that aim to influence decisions about an element of a place.</td>
</tr>
<tr>
<td></td>
<td>SRP3.3 Students apply the principles of democratic decision making in cooperative project.</td>
</tr>
<tr>
<td></td>
<td>LL3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.</td>
</tr>
<tr>
<td></td>
<td>LL3.2 Students present information which illustrates stages in different types of life cycles.</td>
</tr>
</tbody>
</table>
The Arts

Design and create features in the enclosure to suit lifestyle of penguin. Aesthetically pleasing for community. Educational information board on penguins.

VA3.1 Students design, make and modify images and objects applying elements and additional concepts to construct intended meanings.

VA3.2 Students make and display images and objects, understanding the functions of informal and formal display (educational display board).

HPE

Enhancing personal relationships and cooperation within group work.

EPD3.4 Students demonstrate communication, cooperation and decision-making skills to collaborate in social, team or group situations.

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Source of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation: checklist, observational</td>
<td>Students construction of the model</td>
</tr>
<tr>
<td>notes</td>
<td>Is the student working cooperatively/participating.</td>
</tr>
<tr>
<td>Consultation: conference log</td>
<td>Discuss ongoing design proposals and challenges</td>
</tr>
<tr>
<td></td>
<td>with individual group members</td>
</tr>
<tr>
<td>Focused Analysis: checklists, feedback</td>
<td>Oral presentation and demonstration of the model</td>
</tr>
<tr>
<td>sheet</td>
<td>Group discussion, portfolio, design notes/diaries</td>
</tr>
<tr>
<td>Peer and self-assessment: peer evaluation</td>
<td>Peer evaluation of oral presentation, self</td>
</tr>
<tr>
<td>sheets, reflection sheets</td>
<td>reflection on design challenge</td>
</tr>
<tr>
<td>Criteria Sheet:</td>
<td>Final production and presentation</td>
</tr>
</tbody>
</table>

Context:

Community – creating a design that meets the needs of the visiting tourists
Business – through budgeting, planning, research and design students apply business principles to achieve their goal.
Environment – what impact will the reconstruction have on the other animals in the theme park?
Personal – imagination, creativity, critical thinking, decision making and problem solving skills
Educational – the design allows for the educational component of informing the community about penguins.
School – the students benefit from group work and interacting with teachers and the community.

Appropriateness:

Ethical - Has the particular use of the enclosure been considered i.e., is it suitable for penguins? Is it a natural surrounding?
Functional – does the design need to suit a desired location with minimal impact. Have all aspects of the surrounding environment been considered before the design phase?
Aesthetic – Does the design reflect creative flair and would it appeal to the wider community and stakeholders? Is the design aesthetically pleasing?
Economic – Is the design economically viable? Will it encourage more tourists to visit the area?
Social - does the design cover the educational purposes for students and wider community?

Resources: Materials: newspaper, glue, masking tape, cardboard, water bottle, paint, plastic, straws, cardboard roll, flour, paper, matchsticks, cotton, old fish tank grid, mesh, jelly.

Management:

Managing people: Students to work in groups of 4-5. Teacher to outline safety instructions. All students are required to make equal contribution to their group’s design challenge. Teacher consultation as necessary with students.
Managing resources: allocate classroom working space for each group. Provide access to resources and tools. Students to gather extra materials they require. Students to clean up and store equipment.
Managing opportunities: Students examine other creative ideas. Students to use initiative when researching, planning and presenting final design challenge.
Managing constraints: Students should adhere to the parameters of the design challenge. Design parameters include the due date, $10 budget, dimensions of the model.
Design Challenge: Ideal Classroom
Welcome students – being the future generation the Queensland government needs your help. With the upcoming election nearing an end I have set aside extra funds for education. As students in the classroom environment you know better than anyone what a classroom needs. So I am proposing a challenge for you… I have promised Queensland I will create a new prototype for all Queensland classrooms. As I have not been in schools for many years and do not know their current requirements I am asking for your help. I want you and a friend to design an ideal classroom. The ideal classroom is specifically designed to provide a collaborative learning environment in which students and teachers are immersed in the learning experience. With a budget of $10 and a size restriction of 45cm x 45cm x 30, you will present your classroom to a panel of my fellow members of parliament and the best design will be designed in the new schools. Good luck students - I look forward to seeing your designs.

Outcomes, Levels and Strands: Level 5
Technology Practices
TP 3.1 – Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 – Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP 3.3 – Students cooperatively develop and follow production procedures to make products that reflect their designs.
TP 3.4 – Students test and judge how effectively their own and others’ processes and products meet the design challenge.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.

Activities:
Investigation
Students examine and identify key issues associated with classroom design i.e. ways in which they feel the design of a classroom will maximise learning for all students.
Students analyse through using a PMI chart the key features of a classroom in which they can improve on when designing their challenge.
Students gather research through interviewing stakeholders i.e. students, teachers, parents etc and visiting classrooms to determine the features of an ideal classroom.
Students research the necessary elements of design and any additional information that will be of use when designing an ideal classroom through books, internet, magazines, interviews, meeting etc.
Ideation
Students work in collaboration to generate ideas through brainstorming and group discussions that will help them select the key features of the ideal classroom.
Students communicate with each other throughout all stages of the design challenge exchanging ideas about all aspects of planning, designing and creating.
Students begin to plan the design solution by discussing and recording design elements, construction strategies and management.
Students design detailed sketches of the proposed design incorporating key features from their research.
Production
Students create resource / materials lists of items that will be required to build the design solution as outlined in the detailed sketch.
Students develop a construction schedule and proposed materials budget list to adhere to time and budget constraints.
Students manage the responsibility of individual group members.
Students make the design challenge taking into consideration their research, planning and resources.
Evaluation
Students test their ideal classroom making sure they have met all the set criteria.
Students design challenge is judged when presented in front of the panel according to specific criteria.
Students reflect on feedback given by the panel and their peers for future design challenges.
Students compare models using techniques such as question and answer time highlighting to all students the process in which they carried out that left them with their final product.

Crosscurricular Learnings – Level 3

<table>
<thead>
<tr>
<th>KLA and Outcomes</th>
<th>ACTIVITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics:</td>
<td></td>
</tr>
<tr>
<td>M 3.1 Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents</td>
<td>Measuring, building, creating models to scale.</td>
</tr>
<tr>
<td>N 3.2 Students identify and solve addition and subtraction problems involving whole numbers and decimal fractions in context selecting from a range of computation methods, strategies and known number facts.</td>
<td>Students list accurate measurements and the cost of all materials used to create the design.</td>
</tr>
<tr>
<td>Science:</td>
<td></td>
</tr>
<tr>
<td>NM 3.3 Students collect information to illustrate how combining different materials influences their usefulness.</td>
<td>Guest speaker will be invited into the classroom to inform students about the appropriate materials used in an educational setting and their compatibility with workplace Health and Safety Regulations.</td>
</tr>
<tr>
<td>SOSE:</td>
<td></td>
</tr>
<tr>
<td>SOSE - PS 3.2 Students create and undertake plans that aim to influence decisions about an element of a place.</td>
<td>Students create a plan of their classroom with the key element in mind (classroom environment) and consider all the possible influencing factors of who and what will be affected.</td>
</tr>
</tbody>
</table>
A vast range of resources are able to be used in the design process these include art and craft supplies (glue, scissors, cardboard, paint), household goods (tooth picks, wooden skewers, food colouring) and recycled materials (cardboard, food containers, plastic). These resources can be obtained from sources such as recycling depots, home etc. Students will need to be made aware of safety issues, school procedures and rules of the design challenge.

### Managing Constraints

- **Constraints:**
  - Students must not exceed the $10 Budget and size
  - Students have the option to designate roles in order to stay within the time constraints and work efficiently. Students will be made aware of safety issues, school procedures and rules of the design challenge.
  - All students will be given the same amount of time and access to resources and will be given the opportunity to convince and persuade the judges as to why their design is ‘the ideal classroom’.

### Managing Opportunities

- **Opportunities:** Students have the opportunity of further research into marketing strategies as to how they will promote their ideal classroom to the panel of parliamentary panel.

### Managing Resources

- **Resources:**
  - Resources can be obtained from sources such as recycling depots, home etc. Students will need to be made aware of safety issues, school procedures and rules of the design challenge.

### Managing Context

- **Context:**
  - The design challenge is to be completed over a course of seven weeks. Students need to create a timeline and stay on schedule throughout the seven-week period. Students must not exceed the $10 Budget and size constraints.

### Assessment Ideas

<table>
<thead>
<tr>
<th>Technique</th>
<th>Method for Assessing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Informal observations of students working through each phase of their design challenge using anecdotal notes and checklists.</td>
</tr>
<tr>
<td>Student Teacher Consultation</td>
<td>Consult with students on design ideas, have meetings with groups as well as individuals. Anecdotal records and questions to students.</td>
</tr>
<tr>
<td>Focused Analysis</td>
<td>Oral presentation to the panel of parliamentary members, persuading, imaginative introduction, logical structure and relevant conclusion.</td>
</tr>
<tr>
<td>Peer and Self Assessment</td>
<td>Criteria sheets, question and answers, checklists, gallery walk.</td>
</tr>
<tr>
<td>Criteria Sheets</td>
<td>Students have met all facets outlined in the criteria sheet to an acceptable standard.</td>
</tr>
</tbody>
</table>

### Context

- **Personal** – Students will consider the changes in technology and its ultimate influence on education and learning. These changes continually create the need to modify teaching methods, school requirements and resources.
- **School** – This design fosters skill development through areas such as co-operation, time management, creativity and imagination. Students will gain an appreciation of the needs and requirements of the ideal school classroom and design and create their model to meet these requirements.
- **Business** – Students have the opportunity of further research into marketing strategies as to how they will promote their ideal classroom to the panel of parliamentary panel.
- **Environment** – Students must take into consideration the needs of Community in regards to how their ideal classroom will impact on the environmental surroundings.
- **Community** – Students have to take into consideration the needs and wants of their particular community when planning for the design challenge i.e. are they situated in an area with a high incidence of students with behavioural problems.

### Appropriateness

- **Functional:** Does the ideal classroom coincide with all the necessary educational requirements of a classroom? Is the design realistic for the future i.e. taking into consideration budget, size of desks adequate for student learning etc?
- **Ethical:** Access areas and all other facets of the classroom design have been given a sufficient amount of space for all people eg students with wheel chairs. Desks have been placed strategically throughout the room allowing children with impaired vision and hearing to learn in an optimal learning environment.
- **Environmental:** Is the design built with the intention of saving the environment? i.e. taking into consideration limiting the use of electricity, building the classroom with environmentally friendly materials etc.
- **Economic:** Is the design viable in relation to cost? Will there be enough funds to maintain all electronic equipment? How much will the actual design cost in total?, how often will this classroom need to be updated to provide all students with maximum learning?
- **Cultural:** Does the design take into consideration and recognise the needs and requirements of different cultures.
- **Aesthetic:** Does the design employ design elements such as colour? Is the layout well organised and appropriately set out for a classroom environment that will provide maximum learning to all students?
- **Social:** Is the design suitable for all year levels and assessable for each individual student? Is the design structured for group and individual learning?

### Resources

- A vast range of resources are able to be used in the design process these include art and craft supplies (glue, scissors, cardboard, paint), household goods (tooth picks, wooden skewers, food colouring) and recycled materials (cardboard, food containers, plastic). These resources can be obtained from sources such as recycling depots, home etc. Students will need to carefully consider the resources they use to adhere to the $10 budget.
Design Challenge: Turbo-vac 5000
(Built in technology to make life easier)
It is the year 2240 and our lives are busier than ever! There exists a myth that once, long ago, there were people who worked as housewives or husbands, the demands of work are so high that leisure time is of the utmost importance, so there is no time for house cleaning. But the health and safety of the population must not suffer. What are we to do? Obviously we must utilise our technology to create some way of keeping our houses clean and hygienic that is time and labour saving. This is the job you have been commissioned for; we need a prototype no larger than a shoebox in 10 weeks, which you must present to the Board of Futuristic Designs. Good luck!

Outcomes, Levels and Strands:
TP 3.1 – Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2 – Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
INF 4.2 – Students apply techniques for transforming and transmitting information for different audiences.
MAT 3.2 – Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
SYS 4.1 – Students identify and explain the logic of systems and subsystems.

Activities:
Investigation – the teacher will introduce the students to the year 2240 and what life is now like. Everybody works and no-one has time to waste on housework, yet we all take pride in our homes, and need things to remain clean and healthy. So it is up to them to find a solution, a way that all houses can be kept clean without the need for time-consuming human labour.
- Students will be required to use books, magazines and the Internet to determine how the technology behind cleaning works.
Ideeation – After this research, students in their groups will need to brainstorm different ways they could effectively utilise similar technology, yet without the human labour that is involved with it at present.
- They will also need to do basic drafts of several of their best design proposals which they can analyse and then select their best one. This stage should be recorded in a technology design process journal (kept by the students).
Production – Students gather a range of everyday, recycled and inexpensive materials that are suitable for use in the creation of their chosen design. They then begin the actual production process where the group cooperatively creates a prototype of the design that is no bigger than the size of a shoebox. This stage should also be well documented in the design journal, and digital images may be taken.
Evaluation – Students will be required to present their final designs to the class in a sales pitch presentation, as if trying to sell this new product to potential consumers. They must discuss how the prototype works, mention the process they went through to come up with this final design and finally why it is such a necessary item for citizens in the year 2240.

Crosscurricular Learnings:
English – Oral presentation (sales pitch) discussing the completed, final product design.
The Arts – A visual diary of the design process must be kept and then displayed at the conclusion of the design challenge. This will include ideation and brainstorming stages, photographs and drawings of the product over time and at its final stage.
ICT – Introduce students to Architecture online (www.sanfordcorp.com/artedventures) where they can be an online architect and design floor plans for their own futuristic homes.
SOSE – Students will research the staggering amount of household rubbish that is produced on a daily basis and consider environmentally friendly ways to dispose of these ever-increasing amounts.
Science – Students will investigate the mechanical processes behind how the Hoover works and look at ways of transferring this knowledge into a new, labour-saving design.

Assessment Ideas:
Observation – Throughout the entire unit of work teachers will circulate amongst the groups and look at the engagement of individuals and groups, which can then be recorded through annotated notes.
Presentation - At the conclusion of the design process groups will be required to present their designs and provide reasons for the choices they made. This will be assessable.
Self-Assessment - Students will assess their own contributions through the entries they make into their ongoing design journals.
Peer Assessment - At the conclusion of the unit group members will complete a form that asks questions regarding the input from the other members of their group throughout the design period. Also this information should be noted throughout their design journals, which will be read by the teacher during and at the conclusion to the design process.
Portfolio – Students are required to submit a folio of each stage of investigation, ideation, production and evaluation. This should include sketches, photos, materials list and production journal.

Context:
School – Students must learn to manage their time and limited resources effectively and work co-operatively with the other members of their group, as they have been set an important task by the Board of Futuristic Designs (group of teachers.)
Personal – Students must look at was in which they can meet the needs of themselves and others through the creation of a new product.
Industry – Students must look at the design and production of an already existing product – the Hoover and then how this design can be altered to create something new, and labour saving, following the design process.
Environment – Students must consider the environmental impact of the large amount of household rubbish that is produced daily and the best ways of dealing with this.
Appropriateness:

Functional – The final design must have some functional aspects, be a working design to some extent, so the Board upon presentation can visually see design features and concepts involved.

Aesthetic – The mechanism/design must be visually appealing, minimal in essence, as it is to fit unobtrusively into the households of the future.

Economic – The cost students may spend on their design is limited to $5 and all expenses must be noted.

Environmental – Students will be using mostly recycled materials in their design, and must consider the concept of waste and rubbish in depth throughout the entire design process.

Social – This task must involve non-exclusive group work, with all group members being expected to participate.

Ethical – Ethical behaviour at all times throughout this design challenge is also expected.

Cultural – This design should be able to be implemented across any culture and not be exclusively aimed at Western culture. It should take the needs of other cultures into account (where necessary).

Resources:

Students will be able to use any classroom materials they require including: paint, glue, brushes, scissors, sticky tape, newspapers, wood, plastics, Internet, computers, Library, books and anything else available. Each group must bring in their own cardboard box, and other specific, recycled resources they may require for their design project, keeping in mind the budget of $10 they have been limited to. The school also owns a vacuum which will be available for the students to examine and use where necessary.

Management:

Managing people – Students cooperatively design and create their project in either pairs or threes. Students are placed at the centre of their learning, and direct their design challenge in whichever direction they decide is appropriate, as a result of through research and questioning.

Managing resources – Students effectively use materials that are recycled, from home or school or cheap to purchase, but they will need to effectively manage not only the physical resources they will be using, but also that of time, space and information in order to complete their design in time.

Managing opportunities – Students will provide feedback regarding their own input and that of the other members of their group through their individual design journals. They will also engage in the marketing of their final product through presentations to the Board of Futuristic Designs.

Managing constraints – Students have been limited to the creation of a product that is no larger than the size of a shoebox, maximum dimensions (450mm x 450mm x 350mm). They have also been given a budget constraint of only $10 with which to purchase materials for their design, the rest of the materials must be recycled from home or school. The design budget must be presented to the Board in the design journals of the group.
Healthy Heroes - Hayden Park and Samantha Muir

Design Challenge: “Healthy Heroes”
Attention primary school students! Universal Studios is on the hunt for new movie producers! They need your help in creating the new character which will star in its upcoming movie production. What you choose to create is up to you; however, your design should include at least one aspect associated with a healthy lifestyle. You should use recycled materials where possible and not exceed a budget of $10 with your design. To ensure the animation technicians can accurately reproduce your creations their dimensions should not exceed 450mm × 450mm × 300mm in size. So get designing now, Hollywood can’t wait to see the results!

Outcomes, Levels and Strands:

<table>
<thead>
<tr>
<th>STRAND</th>
<th>LEVEL</th>
<th>OUTCOME STATEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TECHNOLOGY PRACTICE</td>
<td>TP 3.1</td>
<td>Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.</td>
</tr>
<tr>
<td>TP 3.2</td>
<td>Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.</td>
<td></td>
</tr>
<tr>
<td>TP 3.3</td>
<td>Students cooperatively develop and follow production procedures to make products that reflect their design ideas.</td>
<td></td>
</tr>
<tr>
<td>TP 3.4</td>
<td>Students test and judge how effectively their own and others’ processes and products meet the design challenge.</td>
<td></td>
</tr>
<tr>
<td>INFORMATION</td>
<td>INF 3.1</td>
<td>Students describe advantages and disadvantages of different sources and forms of information.</td>
</tr>
<tr>
<td>INF 3.2</td>
<td>Students select and use techniques for generating, modifying and presenting information for different purposes.</td>
<td></td>
</tr>
<tr>
<td>MATERIALS</td>
<td>MAT 3.1</td>
<td>Students choose materials according to various characteristics that best suit the product and user.</td>
</tr>
<tr>
<td>MAT 3.2</td>
<td>Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.</td>
<td></td>
</tr>
</tbody>
</table>

Activities:
Investigation (Examining, Analysing, Gathering, Recording …)
Students can investigate and gather background knowledge through browsing the internet, magazines, brochures, and educational documentaries. Then students can access resources such as family members, schools, community centres, heart foundation, and universal studios. Also students can investigate current promotional figures in movies, and analyse the characteristics and ideas that are used to promote them.

Ideation (Generating, Communicating, Planning, Designing …)
Through the ideation phase the students must consider the audience the product is being marketed to, and take into account their interests and wants. Then the students must decide on a focal point for their product and discuss, in their group, to come up with a design. Then students plan and design the creation of a healthy eating movie character, and consider the types of recycled materials they can use, thus keeping within the budget.

Production (Creating, Developing, Managing, Making …)
Throughout the production stage the students develop a plan to create their design challenge, which will adhere to their budget and timeframe. Then students create a model of a superhero which can be used to inform the movie makers on their creation. Then students give feedback on the management of their creation.

Evaluation (Testing, Judging, Reflecting, Comparing …)
Students critically evaluate whether they have met the criteria in the design challenge. Then students are to present the design challenge to peers/ the teacher/ parents to explain the construction process, the difficulties, and the justification for the choices made. Students them receive feedback forms to reflect on any modifications that could be made.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>ACTIVITIES</th>
<th>OUTCOMES, LEVELS &amp; STRANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGLISH</td>
<td>- Students develop a written advertising proposal.</td>
<td>STRAND: WRITING &amp; SHAPING</td>
</tr>
<tr>
<td></td>
<td>- Students present advertising proposal in groups.</td>
<td>CR 3.3 choose aspects of subject matter and particular attributes, processes and visual resources to construct positive or negative representations of people, places, events and things.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CU 3.3 consider interests of the audience when selecting subject matter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STRAND: SPEAKING &amp; LISTENING</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CU 3.1 make choices of subject matter depending on audience, purpose and the medium.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OP 3.1 speak audibly and with clarity by using projection, articulation and appropriate volume.</td>
</tr>
<tr>
<td>THE ARTS</td>
<td>- Students design and make the object that promotes nutrition.</td>
<td>STRAND: MEDIA</td>
</tr>
<tr>
<td></td>
<td>- Students include a folio of the intended meanings of the object.</td>
<td>ME 3.1 Students combine and manipulate media languages and technologies to construct intended meanings.</td>
</tr>
<tr>
<td>SOSE</td>
<td>- Students conduct a survey on the dietary intake of their classmates, and compare it to International statistics.</td>
<td>STRAND: PLACE &amp; SPACE</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PS 3.3 Students cooperatively collect and analyse data obtained through field study instruments and surveys, to influence the care of a local place.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STRAND: CULTURE &amp; SOCIETY</td>
</tr>
</tbody>
</table>
|                  |                                                                           | CI 3.1 Students identify the contributions of diverse groups, including
migrants and indigenous peoples, to the development of their community.

**MATHEMATICS**
- From surveys gathered in SOSE students develop their own word problems.
- Then students swap word problems and complete each others problems.

**STRAND: CHANCE AND DATA**
CD 1.2 Students collect and classify data to investigate particular situations and create and interpret simple displays.

**SCIENCE**
- Students conduct experiments on there eating patterns to see what healthy eating is, and how it will affect the strength of their promotional object.

**STRAND: LIFE & LIVING**
LL 3.1 Students draw conclusions about the relationship between features of living things and the environments in which they live.

**HPE**
- Students research different aspects that contribute to healthy lifestyles (e.g. physical activity, healthy diets). They are encouraged to incorporate their findings into their designs.

**STRAND: PROMOTING THE HEALTH OF INDIVIDUALS AND COMMUNITIES**
PH 4.4 Students justify the selection of health products and services that best meet their health needs.
PH 4.5 Students identify aspects of their social and physical environments that enhance, or pose threats to, their health, and plan strategies for achieving healthy environments for themselves and others.

**Assessment Ideas:**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Instrument</th>
<th>Outcomes</th>
<th>Evidence</th>
</tr>
</thead>
</table>
| Observation | - Observations notes  
- Checklists  
- Anecdotal records | SOSE: PS 3.3  
Mathematics: CD 1.2 | The teacher uses checklists to observe and assess outcomes when students are cooperatively collecting and analysing data. |
| Consultation | - Reflection sheets  
- Learning logs | Technology: TP 3.1  
Science: LL 3.1  
HPE: 4.4 | Students meet with the teacher before building their designs. Students discuss the purpose and features of their designs. |
| Focused Analysis | - Student Folios  
- Criteria sheets  
- Feedback sheets | Technology: TP 3.1, TP 3.3, MAT 3.1, MAT 3.2  
English: CR 3.3, CU 3.3  
Mathematics: CD 1.2  
The Arts: VA 3.1 | Students keep a working record of their progress (research, experimental designs, etc) in a folio. Their final designs are assessed against a set of criteria. Teacher provides feedback on the students’ designs. |
| Peer/ Self-Assessment | - Peer-assessment sheets  
- Student diaries | Technology: TP 3.2, TP 3.4  
English: CU 3.1  
HPE: HP 4.4 | Students present their designs to the class group who are given the opportunity to critique the designs presented and provide this feedback to the student. Students also keep a diary of their progress as a means of being self-directed learners. |

**Context:**
School – students work collaboratively with their peers, enhancing communication skills and peer relationships and in doing so, learn to participate effectively in the community.
Personal – students integrate their own ideas into the design of their heroes.
Industry – students work through the ideation, investigation and production processes to create their heroes.
Business – students consider elements to their heroes that may make them more attractive for marketing purposes.

**Appropriateness:**
Functional – the design of the hero meets the movie production size requirements.
Economic – the design of the hero meets the $10 budget.
Social – the hero is shaped by the needs of current communities and works to break down social roles and constructions of gender.
Cultural – the design recognises, accepts and is sensitive to different cultural groups on a global scale.
Aesthetic – the design balances sensory appeal and appropriately reflects its purpose.

**Resources:**
Newspaper, chicken wire, paint, craft glue, fabric off cuts, super glue, pencils, paper, sticky tape ...

**Management:**
People – students work collaboratively with their peers, building communication, negotiation and conflict resolution skills. The teacher acts as the facilitator.
Resources – the students and teacher contribute to the accumulation of the recyclable resources prior to engaging in the design challenge.
Opportunities – All students are given equal access to the available resources, adequate time is provided in class, and students are encouraged to participate equally during group work.
Constraints – the size, production costs, and time constraints are made explicit to the students.
Dear 5M

My name is Frumpty Dumpty. I am sure you have heard the tragic news regarding my brother Humpty Dumpty. I am writing to your class as I have heard of your expertise in safety and transport.

On the 12th of November I am required to attend a very important meeting. But to get to the meeting I must make it over a very high wall and I am scrambling my yolk trying to figure out a safe way to do this. I am contacting you, as I would like to invite each of you to come up with a contraption that will allow me to safely jump from the top of the wall to the ground. The wall is as high as the verandah of your classroom. Whatever you choose to build must not exceed a size of 450mm x 450mm x 300mm. As a well respected environmentalist I ask that you use as much recycled material as possible. If you can substitute a new item for something recycled I would be greatly appreciative. However, you may spend up to $10 on the construction of your design. Please submit your design and an evaluation of your work by the 1st of November. Your assistance is greatly valued.

Yours sincerely,
Dr Frumpty J. Dumpty

Outcomes:
Year level: 5
Syllabus Level: 3
Syllabus Outcomes:
Technology Practice
TP 3.1 Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.3 Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
TP 3.4 Students test and judge how effectively their own and others' processes and products meet the design challenge.
Information
INF 3.1 Students describe advantages and disadvantages of different sources and forms of information.
Materials
MAT 3.1 Students choose materials according to various characteristics that best suit the product and user.
MAT 3.2 Students select and use suitable equipment and techniques to combine materials accurately in order to meet design requirements.
Systems
SYS 3.2 Students assemble and trial systems they design by considering inputs, processes and outputs.

Crosscurricular Links:
English: - Poetry, letter writing, recounts, play/speech writing, storywriting – rewrite Humpty Dumpty with new characters/ending etc, narratives, write a monologue from view of marginal character.
SOSE- Investigate environmental effects. Construct environmental Impact Report, Investigate modes of transport throughout time, as well as aspects of safety. Include leisure such as base jumping and parachuting (may hold ideas for design challenges!)
The Arts: Song writing, Dance, Drama - Role Play, Public Speaking – orally presenting design, Visual Arts/maths mosaic of Humpty Dumpty - patterns
Maths: Calculate and graph speed of Frumpty falling – take class average, area, cost & budget, timelines,
Science: Investigate impact absorbency, characteristics of an egg, lifecycles, what animals lay eggs, density, water tension

Assessment Ideas:
Anecdotal records and numerical rating – include in student assessment folders.
Student Portfolio of work – students submit a portfolio of their work that will demonstrate unit/term/semester achievements and developments. Must also include evaluations (correct spelling, grammar, punctuation) and reflections.
Self and peer evaluation – in form of scale rating :1, 2, 3, 5
- include constructive comments.
Oral presentation – Present design to an audience using aspects of adept public speaking (eye contact, engagement, audience interest, stance, voice projection, etc)
Exam – short answer evaluative test that will demonstrate student knowledge of techniques and application of technology skills.

Context:
Industry – research transport industry. Is there a market for their product? How will they market it?
Leisure/recreation – Can product be used in a recreational manner?
Business – working to budget and time, consider needs and wants of community.

Appropriateness
Students consider:
Design ideas – how can they be improved? Are they realistic? Do they affectively fulfil purpose?
Processes and products/resources. What is available to them? What are the best choices. Evaluate.
Aesthetic Is appearance a major aspect of design? Why/why not?
Cultural & Ethical Will the design offend or compromise cultural groups or traditions within the community? If so, how can you overcome this?
Economic Will the design fit the budget?
Environmental How will the product affect the environment? Are resources environmentally sustainable, beneficial or detrimental?
Functional Does the design meet its purpose? How? Why?
Management:
People: Organisation of self, using knowledge of others effectively, efficiency.
Resources: Are resources accessible, appropriate, functional, how are they distributed fairly, ease of acquiring relevant information.
Opportunities: Evaluate product, can it be marketed?
Constraints: Access to work areas and resources, time (2 weeks at school), budget ($10)

Resources:
Compile list of material, people, information and area resources.
The Gold Coast Bridge – Kristen Holmes and Linda Ivanov

Design Challenge: The Gold Coast Bridge

The Gold Coast City Council has recently released Design Challenge Specifications for the redevelopment of the Gold Coast Bridge located in Southport. Entry is open to all Australian citizens, with the finalists being announced by the Queensland Premier at the inaugural Queensland Development Awards. Entrants will need to submit a scale model of their proposal no later than 3pm, September 10th 2008 to the Gold Coast City Council Bundall office. Specifications for the bridge design include three traffic lanes north and south bound, and one pedestrian walk way. A total budget of $10.00 per design entry will be enforced.

Outcomes, Levels and Strands

Materials
MAT 4.1 Students explain how characteristics of materials affect ways they can be manipulated.
MAT 4.2 Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

Technology Practice
TP 4.1 Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
TP 4.2 Students generate design ideas through consultation and communicate these in detailed design proposals.
TP 4.3 Identify & make use of the practical expertise of others when following production procedures to make products for specific users.
TP 4.4 Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

Activities
INVESTIGATION – as carried out to gather knowledge, ideas and data to meet design challenges.
Production – procedures can be identified, described and managed when making products to meet design challenges.
IDEATION – undertaken to generate and communicate ideas that meet design challenges, and to justify the selection of these ideas.
Production – procedures can be identified, described and managed when making products to meet design challenges.
EVALUATION – making judgments about the appropriateness of design ideas, processes and products when meeting design challenges.

Context
Global Through consideration of bridges from around the world, students design a bridge which reflects this new or extended knowledge and understanding.
Business Students are able to submit to a government body (Council) a viable alternate in a real life context.
Personal Students are given the opportunity to become the ‘expert’ and work collaboratively to develop the academic, social and self management skills needed to complete the design and submission successfully.
Communities Through design considerations (aesthetic, environment and community needs) students address and understand both the needs of the local community and the implications of tourism on infrastructure.
Industry Students learn about materials and construction processes involved in designing and building bridges.
School Students become engaged learners through real life experiences with teachers, peers, the community and local Council.

Appropriateness
Functional Is the bridge built to scale? Does it cater for pedestrians, disabled, cyclists and traffic (tourist influx)?
Aesthetic Does the bridge incorporate highlighted attributes of the Gold Coast lifestyle and surrounding environment?
Cultural Are the features or design of the bridge culturally insensitive or offensive?
Economic Was the cost constraint required for the Council submission ($10 per model) achieved?
Social Will the bridge enhance the lifestyle of the local community, including those with special needs? Will the bridge help ensure increasing tourism growth does not impact negatively on local transport infrastructure?
Environment Is the bridge design environmentally friendly and appropriate for the Gold Coast?

Resources

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Unit Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>900 x 600 x 3mm MDF</td>
<td>$3.61</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sandpaper</td>
<td></td>
<td>$0.25</td>
<td></td>
</tr>
<tr>
<td>Blue Glitter</td>
<td></td>
<td>$3.00</td>
<td></td>
</tr>
<tr>
<td>Silver Paint</td>
<td></td>
<td>$1.00</td>
<td></td>
</tr>
<tr>
<td>Jewellery Wire</td>
<td></td>
<td>$1.00</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td>$1.00</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>$9.86</strong></td>
<td></td>
</tr>
</tbody>
</table>

Time limit, financial, equipment and specification constraints considered before commencing design construction.
Assessment
Students compile a technology project folio during design challenge. Folio is to include journal entries, notes, sketches, drawings, designs, plans, multimedia presentations, and model. Samples of this work will be incorporated into student portfolios by negotiation between the teacher and student. Final model will be marked against a student created rubric.

Crosscurricula Learning

<table>
<thead>
<tr>
<th>KLA</th>
<th>RELATED LEARNING</th>
<th>STRAND / LEVEL</th>
<th>OUTCOME</th>
</tr>
</thead>
</table>
| **English** | • Formulate proposal in a covering letter to Council.  
• Script writing for media presentation.  
• Interpreting historical information.  
• Interpreting data and statistics.  
• Create tables and data fields relevant to information gathered.  
• Apply critical literacy skills when investigating and analysing relevant information. | CU 4.2  
OP 4.2  
CR 4.2  
CU 4.3  
OP 4.3  
CR 4.3 | **Reading and viewing:**  
Students should...  
• Identify relevant information and draw conclusions  
• Identify likely audience of texts.  
• Draw on generic structure, paragraphs, patterns of sentences and clauses to make meaning.  
• Identify how certain textual resources have been used to represent people, places, events and things in ways that appeal to different groups.  
**Writing and Shaping:**  
Students should...  
• Select subject matter according to purpose, text type, audience & medium.  
• Organise and link ideas using generic structure, paragraphs, topic sentences and theme position.  
• Indicate certainty using modals.  
• Choose aspects of subject matter, attributes, processes and visual resources to construct representations of people, places, events and things in ways that appeal to certain groups. |
| **Mathematics** | • Build a scale model.  
• Material costing.  
• Interpret map distances & directions.  
• Research population growth on the Gold Coast over the past 50 years and forecast the population growth expected by the year 2026.  
• Research current design specs. for road widths, bike lanes, handrails, disabled facilities etc.  
• Estimate the potential traffic flow over the new bridge design and compare to current traffic flow.  
• Calculate pylons required for the new bridge based on current design ratio. | M 4.1  
CD 4.2  
S 4.1  
S4.2 | **Measurement**  
Students choose appropriate units when estimating and measuring and explain relationships between dimensions when investigating areas, volumes of prisms and lengths of boundaries of rectangles.  
**Chance and Data**  
Students plan and carry out data collections using their own data collection templates, choose and construct appropriate displays and make comparisons about the data based on the displays and measures of location  
**Space**  
Students analyse the geometric properties of a range of 3D and 2D shapes to classify shapes into families and their subgroups and justify reasoning.  
• Students interpret maps and plans with reference to conventions including latitude and longitude for maps, and describe movements using compass points and distance. |
| **SOSSE** | • Research history of bridge design.  
• Research history of Gold Coast Bridge.  
• Investigate population growth on the Gold Coast.  
• Predict the impact that your design may have on both environmental and social fronts.  
• Research design features that cater for minority groups (i.e. disabled)  
• Bridge design aimed at better community infrastructure.  
• Group work strategies | TCC4.4  
TCC4.7  
PS 4.2  
SRP4.2  
SRP4.3 | **Time Continuity and Change**  
Students critique information sources to show the positive and negative effects of a change or continuity on different groups.  
• Students represent eras of past civilisations on a time line or chart.  
**Place and Space**  
Students predict the impact of changes on environments by comparing evidence.  
**Systems, Resources and Power**  
Students plan and manage an enterprise that assists the community or international aid project.  
• Students enact democratic processes in familiar settings using knowledge of representative government. |
| **Science** | • Research the four bridge types.  
• Compare and contrast each design.  
• Carry out paper beam building to test the strength of each and implement this knowledge in the planning and evaluation of your design.  
• Compare construction materials in varying socio economic cultures.  
• Identify factors that will need to be considered prior to the start of building works. (i.e. wind & water) | 4.1  
4.2  
4.3  
4.1 | **Science and Society**  
Students outline some contributions to the development of scientific ideas made by people from different cultural and historical backgrounds.  
• Students use the elements of a fair test when considering the design of their investigations.  
**Earth and Beyond**  
Students summarise information to compare ways in which different communities use resources from the earth and beyond.  
**Energy and Change**  
Students design and perform investigations into relationships between forces, motion and energy. |
| **The Arts** | • Aesthetic appeal of bridge design.  
• Drafting of bridge – 1D  
• Construction of a 3D model using a collection of materials, creative aspects and colour.  
• Compile a video presentation detailing aspects of proposed design | VA3.3  
VA4.2  
ME4.2 | **Visual Arts**  
Students compare elements and additional concepts of images from a variety of cultural and historical contexts.  
• Make & display images & objects considering purposes & audiences.  
**Media**  
Students select media forms and apply technologies to construct and present media texts to target an audience. |
| **HPE** | • Group work strategies.  
• Research and examine current design spec. for disabled persons.  
• Propose, justify and recommend improvements on these designs. | 4.4  
4.5 | **Personal Development**  
Demonstrate skills & actions that support the rights & feelings of others whilst adopting different roles in social, team or groups activities.  
**Promoting the Health of Individuals and Communities**  
Identify aspects of social and physical environment that enhances or poses threats to health & plan strategies for achieving healthy environments. |
Your Own Personalised Stationery - Sharon Rees and Jennifer Macnab

**Design Challenge: Your own personalised stationery**

Your school has decided it would be more beneficial for middle and upper school students to design their own stationery. Our class has been given the honour of designing a basic template each, which can be adapted to fit any situation requiring stationery. Whether for school work, personal or leisure, your own personalised stationery which you design, will be viewed by the rest of the middle and upper school students, as examples of what can be achieved.

**Outcomes, Levels and Strands: Level 4: Outcomes and Strands**

**Technology Practice**
- **TP 4.1** Students use consultative methods to gather knowledge, ideas and data when researching alternatives within design challenges.
- **TP 4.2** Students generate design ideas through consultation and communicate these in detailed design proposals.
- **TP 4.3** Students identify and make use of the practical expertise of others when following production procedures to make products for specific users.
- **TP 4.4** Students gather feedback to gauge how well their design ideas and processes meet design challenges and how effectively products meet the needs of specific users.

**Information**
- **INF 4.1** Students analyse sources and forms of information and match these to the requirements of design challenges.
- **INF 4.2** Students apply techniques for transforming and transmitting information for different audiences.

**Materials**
- **MAT 4.1** Students explain how characteristics of materials affect ways they can be manipulated.
- **MAT 4.2** Students employ their own and others’ practical knowledge about equipment and techniques for manipulating and processing materials in order to enhance their products.

**Systems**
- **SYS 4.1** Students identify and explain the logic of systems and subsystems.
- **SYS 4.2** Students incorporate feedback to refine and modify systems and/or subsystems.

**Activities:**

**Investigation**
Research the internet for different types of stationery and possible designs. Students consider which software program they will use for the design process. Students consider different fonts, colours, logos, etc. Researching software programs to see what capabilities are offered within the different programs. Different types of paper are investigated.

**Ideation**
Students form groups of around 6 and brainstorm ideas for their stationery design, logo and materials and place these ideas in individual design diaries. Students use these ideas to formulate an appropriate plan for their design challenge. Students identify particular design characteristics they wish to use from brainstormed ideas and through investigation on computers. The design being used is recorded in design diary. Expenses are considered, ensuring final product does not exceed $10.

**Production**
Students complete production of the stationery using computer programs such as Word or Publisher. Students select the paper required for the design and print samples to be presented to the class. Students record in diary any changes, successes and failures along the way.

**Evaluation**
Students use their design diary to write journals to reflect on the investigation, ideation and production processes, as well as reflecting on the finished product and whether the finished product turned out as expected and met their goals. This is used as a form of self-evaluation.

**Crosscurricular Learnings**

<table>
<thead>
<tr>
<th>SOSE</th>
<th>CI 4.5</th>
<th>Students express how material and non-material aspects of groups influence personal identities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCIENCE</td>
<td>NPM 4.3</td>
<td>Students examine and assess ways that materials can be changed to make them more useful.</td>
</tr>
<tr>
<td>THE ARTS</td>
<td>VA 4.2</td>
<td>Students make and display images and objects, considering purposes and audiences.</td>
</tr>
</tbody>
</table>
| ENGLISH | Cu 4.3 | When writing and shaping, students:  
| | | • select subject matter according to purpose, text type, audience and medium  
| | | • organise subject matter that develops a topic or storyline, supports a point of view or offers an explanation  
| | | • develop characterisation that is relevant to the storyline using descriptions, actions and dialogue. |
| | Cr 4.3 | When writing and shaping, students:  
| | | • choose aspects of subject matter, attributes, processes and visual resources to construct representations of people, places, events and things in ways that appeal to certain groups. |

**Assessment Ideas:**

<table>
<thead>
<tr>
<th>Technique/Instrument</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focused Analysis</td>
<td>Oral presentation</td>
</tr>
<tr>
<td>Observation</td>
<td>Anecdotal records, monitor participation and groups and individuals remain on task. Ensure timely progression.</td>
</tr>
<tr>
<td>Checklist</td>
<td>Completion of plan, design and finished products</td>
</tr>
<tr>
<td>Teacher Consultation</td>
<td>Respond to students where required, providing feedback.</td>
</tr>
<tr>
<td>Oral Presentation</td>
<td>Contribution and participation</td>
</tr>
<tr>
<td>Self-Assessment</td>
<td>Reflections in Design Diary</td>
</tr>
<tr>
<td>Port-folio of work</td>
<td>Completed product, including planning and samples.</td>
</tr>
</tbody>
</table>
Context:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global</strong></td>
<td>Develops literacy through the use of stationery for different genre including letter writing.</td>
</tr>
<tr>
<td><strong>Community</strong></td>
<td>Stationery can be used within the community for communicating different purposes.</td>
</tr>
<tr>
<td><strong>Home and family</strong></td>
<td>Students can use their own stationery in the home environment.</td>
</tr>
<tr>
<td><strong>School</strong></td>
<td>Promotes and develops literacy skills through the use of their own stationery design.</td>
</tr>
<tr>
<td><strong>Personal</strong></td>
<td>Development of personal identity and literacy skills through using their own personal stationery with their own logo.</td>
</tr>
</tbody>
</table>

Appropriateness:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aesthetic</strong></td>
<td>The product must appeal to the user, who is the designer.</td>
</tr>
<tr>
<td><strong>Cultural</strong></td>
<td>Different cultures are embraced and possibly used within personal design.</td>
</tr>
<tr>
<td><strong>Economic</strong></td>
<td>Must be within the $10 budget.</td>
</tr>
<tr>
<td><strong>Environmental</strong></td>
<td>Recycled products used where possible, particularly encourage recycled paper.</td>
</tr>
</tbody>
</table>

Resources:
- Microsoft Word Software
- Publisher Software
- Other software as required by students, such as Paint, Inspiration, etc
- Basic software instructions from Learning with ICTs Griffith University
- Computer
- Printer
- Internet
- Paper
- CD for students to take software template home

All of these items must remain within $10 budget. The computer, internet, printer and software are available in the school, so the only expense should be the paper, printer ink and CD.

Management:

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Managing people</strong></td>
<td>Students work individually and in groups. Groups of students learn to use programs together and brainstorm ideas together promoting team work and collaborative learning. Individual work while producing personal stationery promoting personal identity.</td>
</tr>
<tr>
<td><strong>Managing resources</strong></td>
<td>Computer, internet, printer and software provided at school. Paper bought from local stores.</td>
</tr>
<tr>
<td><strong>Managing opportunities</strong></td>
<td>Students are continually managing opportunities through considering the purpose of each time of stationery and their final presentation.</td>
</tr>
</tbody>
</table>
| **Managing constraints** | • Students will be required to design stationery within a budget of $10.  
• The size of the stationery set together must be within 450mm x 450mm x 300mm |
Get Up and Go – Jody McCaffrey and Robyn Thomas

Design Challenge: GET UP and GO
With an increasing number of Australians wanting to get back to nature and travel in remote areas, there is a need for a new and improved way of camping. Your challenge is to design a prototype for a new way of camping that allows the outdoors experience to be hassle free and allow for camping in remote areas. The accommodation unit should be of a simple design to keep within the set limitations of: $10 budget 450mm x 450mm x 300mm.

Outcomes, Levels and Strands:
Technology Practice –
TP3.1: Students examine knowledge, ideas and data from a range of sources and establish the relevance of this information when meeting design challenges.
TP 3.2: Students collaboratively generate design ideas and communicate these using presentations, models and technical terms.
TP3.3: Students cooperatively develop and follow production procedures to make products that reflect their design ideas.
Materials –
MAT 3.1: Students choose materials according to various characteristics that best suite the product and the user.
Systems –
S3.1: Students identify and describe relationships between inputs, processes and outputs and systems.
S3.2: Students assemble and trial systems they design by considering inputs, processes and outputs.

Activities:
Investigation is carried out to gather knowledge, ideas and data for use in meeting design challenges.
1. In pairs or small groups students survey local camping stores to investigate what products are currently available and generally what the public want when going camping. This includes students own thoughts and ideas.
2. Students will research further resources (Local library, internet, general public, family, camping grounds and so on) for more in depth findings.
3. Students summarise survey information. As a whole class all students participate in a hot potato activity, and then conduct a class discussion to share knowledge. All activities and findings will be recorded and filed in individual student’s working design challenge portfolio.
4. Students in small groups attempt to erect a tent on the school oval. This gives the students first hand knowledge of what is required in the processes of putting up a tent. Using a SWOT analysis students reflect upon this experience in their design folios. From this students will be motivated when undertaking the production process.
Ideation is undertaken to generate and communicate ideas that meet design challenges, and to justify the selection of these ideas.
1. In pairs students list and sketch ideas for new style camping in portfolios.
2. Students group up with another pair and collaborate ideas from their own ‘Design Folios’. This is done through a Buzz group activity, where key design features are discussed for their new way of camping. Now as a group of four they agree on a prototype and thus list and sketch its design features which are clearly labelled in their design folio.
Production procedures can be identified, described and managed when making products that meet design challenges.
1. In their group of four students will elect individuals to collect specific materials to construct their prototype. Once they have acquired all the necessary materials students will collaboratively construct this model using their design sketch as a guiding tool. All students’ ideas must be acknowledged throughout this process.
2. Students will consider the inputs, processes and outputs of their new design prototype of systems when designing, constructing and testing their systems for affectability and functionality.
Evaluation It’s undertaken to make judgements about the appropriateness of design ideas, processes and products when meeting design challenges.
1. Students have now completed their prototype and in groups are to present their design challenge to a panel of “professionals” (Head of camping Queensland, Environmental scientist and a Health and Safety officer who are roll played by teachers). This presentation must be persuasive to influence this panel’s decision towards their design challenge construction as innovative or still needs working. Students must also explain their process of working technologically as a team to construct a design solution.
2. Class display their design challenges as a gallery walk, for students to critically analyse each others constructions. Each student will record their ideas and opinions on paper which will be deposited in a box next to the prototype.
3. In their design challenge group students share peer comments and individually write a reflection with consideration to these comments which incorporates a final summary of the whole design challenge experience.

Crosscurricular Learnings:

<table>
<thead>
<tr>
<th>KLA</th>
<th>Activity</th>
<th>Strand Level and Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Persuasive oral presentation in front of panel professionals.</td>
<td>English – Writing and shaping and Speaking and listening</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CU 3.3- When writing and shaping students:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Negotiate purposes for writing and shaping</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Consider interests of the panel when selecting subject matter.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Select relevant genre and medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Research familiar and unfamiliar ideas and information to develop a topic or argument that uses some elaborated ideas when supporting details.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CR 3.3. 3.1 – When writing and shaping and speaking and listening students:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Choose aspects of subject matter and particular attributes, processes and visual resources to construct positive or negative representations of people, places, events and things.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OP 3.1 – When speaking students:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use logical sequences when organising ideas.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Use statements questions and commands to generate and maintain discussions and conversations.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Speak audibly and with clarity by using projection and articulation and appropriate volume.</td>
</tr>
<tr>
<td>Math</td>
<td>Students while designing will use scale measurements to create prototype.</td>
<td>Maths – Measurements – Length, maths, area and volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M 3.1 – Students identify and use equivalent forms of standard units when measuring, comparing and ordering, and estimate using a range of personal referents.</td>
</tr>
</tbody>
</table>
Assessment Ideas:

<table>
<thead>
<tr>
<th>Assessment Techniques</th>
<th>Source of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation</td>
<td>Team work and ethics will be observed with close attention to participation.</td>
</tr>
<tr>
<td>Consultation</td>
<td>Between students and teacher regularly. Surveys and discussions with public.</td>
</tr>
<tr>
<td>Focused analysis</td>
<td>Persuasive oral in front of the panel professionals.</td>
</tr>
<tr>
<td>Self and peer assessment</td>
<td>Gallery walk comments from peers and self reflection in design folio</td>
</tr>
<tr>
<td>Criteria Sheet</td>
<td>Design folio, presentation and final prototype</td>
</tr>
</tbody>
</table>

Context:

**Personal** – Students think of their own needs and wants with regards to camping and thus link it to their design ideas.

**Communities** – Through doing a survey of local community members, camping businesses and family students consider the needs and wants of the community.

**Industry** – Students consider the importance of a functional design for the outdoors.

**Leisure and recreation** – Students consider the purposes of building a new camping prototype in relation to the needs and wants of the community.

Appropriateness:

**Functional** – Will the prototype still be functional with the modifications they have made to camping. Does the product meet the design requirements?

**Social** – Does the prototype consider diversity of physical abilities? and for difference in vehicles.

**Aesthetic** – Is the prototype pleasing to the eye and fits in with the environment?

**Economical** – Is it within the $10 budget? and were the materials recycled? Students are encouraged to use recycled materials to reduce cost.

Resources:

It is up to the student’s imagination, collection abilities and creativity to decide what to use. These could include: Cardboard, glue, fabric, plastic, sticks, paint, wool etcetera and anything that is found anywhere.

Management:

**Managing people** – Students work collaboratively in pairs, group and whole class settings to complete their prototype. In groups students discuss individual jobs which allows for even distribution of work.

**Managing resources** – Students will be allocated equal amounts of time for construction and use of equipment. The store room will provide a safe place for design challenges.

**Management opportunities** – Students must all be given access to resources (people, material and time) to allow every possibility of success for each group.

**Managing Constraints** – Students will need to complete their designs in the designated time and consider the budget and measurement requirements. They will need to negotiate within their group and possibly other groups in order to have the resources they require.