Technology Education and the Australian Curriculum

Deborah Trevallion and Maura Sellars

Introduction

Australia finally has its first national technology curriculum which is mandatory for all Australian children from foundation to year 8.

The Technologies area has two individual but connected compulsory subjects:

- **Digital Technologies**, where students use computational thinking and information systems to implement digital solutions. Computational thinking refers to problem-solving methods that involve integrating strategies, such as organising data logically, breaking down problems, interpreting patterns and implementing algorithms, all of which are integral to the mathematics curriculum teaching and learning.
- **Design and Technologies**, where students use critical thinking to create innovative solutions for authentic problems.

Digital Technologies

We are currently living a digital existence in a world of constant change; Society has evolved through a number of technological ages: the Stone Age, the Bronze Age, the Iron Age, the Steam Age, the Space Age and we now we inhabit the Information Age (Cowley, 2000). Here digital technology is an integral part of our

D. Trevallion · M. Sellars (✉)
The University of Newcastle, Callaghan, NSW, Australia
e-mail: Maura.Sellars@newcastle.edu.au

D. Trevallion
e-mail: Deborah.Trevallion@newcastle.edu.au

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lives and the internet has made the world smaller, producing a global village. Living in this digital age, in a world that is characterised by a digitised existence and constant change, it is critical that our children are empowered to manage this. They will need to have a deep understanding of information systems as this will enable them to use critical thinking when they manage data, interpret information, use processes and engage with digital systems to make decisions about their future. Digital systems support new ways of working in our global networks and require a new, essential skill set that includes computational and systems thinking.

The aim of the Digital Technologies syllabi is to ensure that all students can:

- create, manage and evaluate sustainable and innovative digital solutions.
- use computational thinking and the key concepts of abstraction to create digital solutions.
- use digital systems to automate and communicate the transformation of data.
- apply protocols and legal practices that support safe, ethical and respectful communications.
- apply systems thinking around information systems and predict the impact of these systems on individuals, societies, economies and environments (ACARA, 2013).

The amount of knowledge in the world is constantly on the increase, until the 1900s information doubled every century, by the end of World War II information was doubling every 25 years, today different types of knowledge, have different rates of growth but on average human knowledge is now doubling every 13 months and with the use of the internet, within the next seven years, this will lead to the doubling of knowledge every 12 h (Shilling, 2013). This vast expansion of information is occurring because as we develop additional instruments to encapsulate and distribute this knowledge, the quicker we are able to create more knowledge. With the increased amount of knowledge now available, we must develop ways to assist our students to validate, digest, analyse and interpret the information into understandings that can be further acted upon. The development of this skill set is heavily reliant on the capacities of students to use their mathematical concepts, processes, knowledge and reasoning as numeracy competencies.

Today's students use the internet to research and find data, teachers need to instruct students how to determine whether the resources they consume online are valid or not and to use this information to make it their own. We must develop autonomous learners who are critical thinkers that will cope in society faced with ongoing change and that requires sophisticated skills in finding patterns and relationships in the data that they generate themselves and in the data that is promoted by other sources. As it is now essential that students learn to think and reason independently, it has changed the teaching and learning dynamic for both students and teachers. Teachers can no longer provide a traditional knowledge-based approach to teaching, as students need to be empowered to manage this change. (Australian Education Council-Curriculum Change) For this to occur, the education curriculum has changed to an inquiry-based approach where the traditional teaching

of information focus has been replaced by the teaching of the skills required to acquire and interpret information using a problem or inquiry-based approach where the students use and apply these skills in order to solve a dilemma that they have been given.

Students are often bombarded with new and fantastic gadgets that include iPods, iPhones, Android devices, tablets, iPads and now hybrid laptops. Many Australian children are exposed to one or more of these kinds of devices at any given time. These communication gadgets, including pedometers and other devices, can be a teacher's greatest tool for the lessons Elston (2013). Students are to be encouraged to use their own digital devices in the classroom in a bring your own device approach. Once the students' devices are connected to the network, a student can begin creating and self-teaching. Students will gain the ability to access any information that they require for their learning task. Through this, the teacher becomes a facilitator of learning rather than the authoritarian source. Students in classrooms taught by autonomy-supportive teachers, compared to students in classrooms taught by controlling teachers, experience an impressive and meaningful range of positive educational outcomes.

In 'Digital Technologies' there is a focus on teaching the students to code. The advantages of teaching students to create programming applications are numerous and especially supportive of the development of numeracy skills. When creating an application that can perform a task, such as a game or data collection, seeing it work is motivating, creating an excitement in the students that pushes them further into the world of digital exploration (Hall, Collier, Thomas, & Hilgers, 2005). Technology is used to support the teaching of numeracy.

Design and Technologies

The practical nature of the Design and Technologies syllabus engages students in critical and creative thinking, including understanding interrelationships in systems when solving complex problems. The aim of the Design and Technologies syllabus is to ensure that students can:

- document and communicate design ideas
- select and manipulate a range of ideas, tools, materials and techniques creatively, competently and safely in the development of designed solutions suitable for a range of technologies contexts
- explore, investigate, create and critique innovative, ethical and sustainable designed solutions using a range of technologies
- develop confidence as critical users and designers and producers of technologies and designed solutions
- understand the roles and responsibilities of designers, technologists and those in related occupations (ACARA, 2013).

The aim of design and technologies education is to develop creative and innovative thinking abilities as well as to develop students' social, cultural and environmental responsibility, as opposed to the conventional mastery of methods, techniques and an understanding of materials, processes and information systems through the application of concepts to problems, much of which is dependent on the logical thinking that students acquire through engaging authentically with mathematical concepts, including generalising and abstracting.

The Design and Technologies curriculum has changed from one that focused on skill-based learning to a holistic design-based curriculum that is intended to develop critical thinking and creative problem-solving skills for all. In the student-centred problem-solving approach, the focus is critical thinking and design. Students are expected to design, make, and evaluate. The process skills of mathematics are critical to the successful engagement of students with the design procedures. Students must have the fluent mathematical knowledge and understand when and where it is applicable. They must be able to effectively communicate mathematical design ideas and have the capacities to engage in the reflection, decision-making, evaluations and validations of their choices that constitutes adaptive reasoning.

Numeracy and Technology: Digital Technologies

The specific numeracy skills that are required for this comparatively new area of teaching and learning are articulated in the Australian curriculum (ACARA, 2012). Many of these basic mathematical skills associated with digital technologies focus on pattern and data production, presentation and interpretation. Students are also required to be able to manipulate numbers as algorithms in order to solve problems and to understand data in its various forms, including but not limited to the number. The data collected is represented in various ways, including technological representations, focussing on the usual visual organisers that are commonly used for number. These may include tables, plans, maps, etc. which are supplemented with other pertinent information in written form. Defining patterns, using software to develop representations and using algorithms to solve problems remain a focus of digital technologies continue into the middle years of primary schooling.

Variations to tables, developed from given data and criteria, known as 'branching' depend on logical decision-making for its successful completion. In the senior years of schooling, students investigate further than the base ten system and explore the digital number coding known as the binary system. Students are required to be able to represent base ten numbers in binary coding using indices and to explain how the binary system operates in digital technologies and robotics. They learn how to use their understanding of symbolic representations to design a digital system interface and how to design, modify and follow sets of algorithms using sequences, branching and repetition, and additionally, using user input. These sophisticated uses of digital systems facilitate student's skills in logically determining the sustainability and usefulness of digital systems in culture and society.

Numeracy and Technology: Design and Technologies

From the outset, the students in their first years of school are incorporating the ideas they have experimented with in mathematics learning, including the notions of push and pull, objects and movements both in the environment in general and in toys and products they use. They further explore the notions of force and movement and properties of some defined three-dimensional objects and materials. They engage in food production for healthy eating, using reasoning skills and those of measurement and relative and absolute quantities. They explore different elevations of objects in evaluating design; make two-dimensional drawings of objects and record data that is the result of fact gathering surveys and questionnaires. They check and evaluate their own constructions using the skills of adaptive reasoning to determine their decision-making, and in all of these activities, the students are required to understand the procedure and work with sequencing that is appropriate for their tasks.

These mathematical skills continue to underpin the learning as the student's progress through the learning in the middle stages of primary schooling and beyond. The investigation of forces and design, properties and construction using measurements, geometry, chance and predictions, whilst continuing to focus on motion and force, recording results and following sequence and procedures become increasingly complex and bound to the mathematical notions, concepts and skills upon which they are reliant. Students are required to engage with various types of mathematical visuals such as maps, diagrams, charts, graphs, grids, etc. both the communicate information they wish to share and to interpret information generated by others. They do this is in the context of recording or disseminating data as well as in making design representations. Models, plans, nets and diagrams that demonstrate their understanding of design and of the process of creating something new.

Conclusion

The teaching of digital technology in every classroom cannot be underestimated. Children now learn digital skills, without realising they are learning it as today it is not uncommon for a three-year-old child to have some basic knowledge regarding how to get on to the computer and load a game (Anderson, 2002). Students learn to use technology by doing and experiencing. If students are to move forward to be effective citizens in our ever-evolving society they need to be efficient users, interpreters and producers of information using digital technologies and the design process. It is important because it is one component of being a digital citizen—a person who is responsible for how they utilise technology to interact with the world around them, yet they cannot do that without significant competencies in numeracy as this underpins many of the ways in which students' experiences are facilitated in this learning domain.

Differentiation: This task can be completed with any fruit as the topic – really anything that grows locally with some success. Students can classify according to which plants have the most leaves, berries (blueberries grow in a pot if necessary). If there are trellises available, then a wide range of winter beans and peas can be grown if climate suits and grapes and other climbing summer edible plants can be grown in summer. Strawberries are a favourite

Australian Curriculum Mathematics Outcomes

(ACMNA001)

Numeracy Links

***E**stablish understanding of the language and processes of counting by naming numbers in sequences, initially to and from 20, moving from any starting point

Australian Curriculum Subject outcomes and elaborations:

Explore how plants and animals are grown for food, clothing and shelter and how food is selected and prepared for healthy eating(ACTDEK003)

The Learning Task Foundation: Planting and harvesting healthy foods

The students plant seeds, seedlings or plants that are more advanced in the school garden or in pots and nurture them to maturity before eating their produce.

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Including ATSI perspectives: The class can find pictures of native fruits and vegetables or be introduced to them by a member of the local community or parent. The class may like to grow native fruits or vegetables in their patch of garden or pot. While some of these are well known generally, it may be useful to look at http://www.mcd.com.au/our-

Strategies to include learners with oral backgrounds: many of these students have come from other climates and countries. They also may have native fruits that they identify from their traditional names. It may be useful fr the class to research the native fruits of their respective homelands and to put catalogue pictures of these and commonly bought or grown fruit on flash cards with the English names for their use. The students may engage with the songs and story about fruit from the video and can be encouraged to make their own oral story about the fruit they like. It may be hard to understand food choices and foods that other children will not eat or dislike. This is because having enough food may have been problematic in the past.

Authentic Assessment strategies:

Correct counting of the hand spaces between the plants, counting the plants, one to one correspondence

Variations for students from diverse social contexts: some students may not each fresh fruit, salad or vegetables for many reasons. Others may not have any opportunities to plant and grow owing to lack of garden space or lack of exposure to these fresh foods. It may be useful to take photographs of the garden as it grows. The students cab do this using iPads.

Technology: Foundation—Growing Healthy Foods

Resources: herbs, lettuce, tomato, strawberry seedlings for summer: bean pea, snow peas, etc. For winter growing or whatever is healthy and grows well in your area. Seedlings are best but seeds can thrive if cared for well but may need extra work thinning out and replanting. Enough planting materials so that each child has at least two items to plant in case of non-survival. A garden bed prepared for planting, paddle pop sticks or plastic spoons for digging and marking, gardening gloves or small sized disposable gloves for student use www.kitchengardenfoundation.org.au.

Introduction:

Australia has an obesity epidemic, especially in our children. Research on Australian children and obesity found that obese Australian children often do not like to eat vegetables which, when eaten regularly in appropriate amounts will prevent obesity in children. It has been found that children will eat vegetables if they grow them themselves.

Discussion: Questions may include:

- Who eats vegetables? Salad? Lots of fruit?
- Where does this all come from? (students may say the garden, supermarket, fruit shop, etc.)
- Do you know anyone with a garden?
- What do they grow?
- Do you eat these?
- Do anyone have a garden at home where they grow things to eat?

Task: Tell the students that they are going to plant some vegetables/fruit, etc. in their school garden.

- Give out the paddle pop sticks or plastic spoons (two per child) and ask students to write their names on them with a marker (or if preferred, the teacher can do this with a permanent marker).
- Practice the digging motion safely so the students know how to dig without having the soil in their neighbour's face.
- Practice the tamping down of the soil gently to secure the plant in the earth.
- Go to the garden and line students up with their gloves, spoons or sticks and their plants.
- They dig a hole large enough for the plant, plant it, tamp it down and put their named stick or spoon in the soil beside it.
- Use hand spaces to separate the plants, less for small plants, more for plants that will grow larger.
- Do the same for the next plant or seed.
- Have spares of plants, seeds and sticks or spoons in case of misadventure!
- Water carefully and *count the number of plants that have been planted.

Differentiation: This task can be differentiated in many ways. The students can design questions to interview practically anyone selected about anything that need to know about. The key to students writing interview questions is to keep focussed on what is useful information. This is an analytical task- deciding what is useful and what is superfluous information.

Australian Curriculum Mathematics Outcomes

(ACMSP048)

Numeracy Links

*Identify a question of interest based on one categorical variable.

**Gather data relevant to the question

Australian Curriculum Subject outcomes and elaborations:

Recognise and explore digital systems (hardware and software components) for a purpose (ACTDIK001) playing with and using different digital systems for transferring and capturing data,

The Learning Task Year Two – Developing a data base

Students need to design questionnaires, conduct the survey and then enter information into a database for the purpose of finding out more about their classmates

Including ATSI perspectives: while this activity is not intended to marginalise, to stereotype or in any way position students in an uncomfortable space, it would be wise to check the questions created by all students irrespective of the student's own background or that of the persons to be interviewed. Some groups of ATSI students and others are uncomfortable with direct questioning, so it is important to ascertain if simply asking – tell me what you like? Tell me about you? Is more appropriate and respectful in your context than a questionnaire.

Strategies to include learners with oral backgrounds: depending on their experiences, some of these students may shock their peers with their stories. They may also find it distressing to talk about themselves or they may nominate their favourite hobbies or sports as other than the usual responses expected from students of this age. They may also try hard to be the same as everyone else and to fit in, despite their real preferences and skills. This activity may need to be thought through in your specific context to determine how exactly these students can be included without compromising them.

Authentic Assessment strategies:

Are students able to develop a short, focussed questionnaire? If appropriate)

Are students able to sort and able information and enter into a data base?

Are students able to find the common ideas and group students appropriately?

Variations for students from diverse social contexts:. As indicated in the ATSI perspectives, respect for difference and the celebration of diversity must be established as the genuine culture of the classroom before this task could be attempted. Different cultural and social perspectives around what is acceptable behaviour and conduct for children and students must be considered. Every child is entitled to their story, their identity and their preferences. Some students with diagnosed disorders may find it very confronting and challenging to be part of this activity and so it would need to be implemented with care and with the students themselves a primary consideration.

- Back in the classroom; make a calendar showing who is watering on each week day with their school buddy. Rainy days can be coloured in blue.
- When the plants are ready, harvest and eat in class or take home carefully in a brown paper bag.

Technology: Year Two—Digital Technology and Data Base

Resources: Class set iPads. Laminated name labels: three for each child in the class.

Introduction:

Design: Your class has fragmented friendship groups and a number of students who are new to the school have been placed in your class this year. To unify the students and build respect between the various cultural groups in your class you need to build friendship bonds and respect between students.

Discuss:

- What is a data base?
- Why do we need a data base of our class to share information?
- What type of information can students share with their peers?
- List possible questions.
- Can we include images and edited video clips?
- How many pages can be allocated to each students?
- How should each student present their information to the class?

Task 1: *design a set of six questions you want to ask three people in your class to determine what they like to do in their spare time, which hobbies they have, which sports they play, which foods they like and anything else you can think may be interesting to know as a friend. Dip into the bag of names and pull three out. (if you get the same name twice, hand it to the teacher and pick out another. The teacher can then replace the duplicate in the bag.

Task 2: *interview your three students using your self-designed questions.

Task 3: **In groups of three, the students are to create a data base on the other students they have interviewed in the classroom. Each group's data base will be put together with the rest of the class in order to share common interests and activities and familial difference.

Task 4: Plan activities that include all the students with similar interests or preferences.

Differentiation: This task can be differentiated in many ways. The students can select a healthy lunch and see if their parents or caregivers are able to make it for them to try. The students can also change some of the ingredients without compromising the healthy nature of the food.

Australian Curriculum Mathematics Outcomes

(ACMSP068)

Numeracy Links

*Identify questions or issues for categorical variables. Identify data sources and plan methods of data collection and recording

**refine questions and plan investigations that involve collecting data, and carrying out the investigation

Australian Curriculum Subject outcomes and elaborations:
Investigate food and fibre production and food technologies used in modern and traditional societies (ACTDEK012) - recognizing the benefits food technologies provide for health nd food safety and ensuring that a wide variety of food is available and can be prepared for healthy eating

The Learning Task Year Three – A Healthy Canteen Menu

Students are required to design a healthy menu for the canteen by researching healthy canteen food on the iPads and then surveying their classmates to establish its popularity.

Including ATSI perspectives: This may be a genuine opportunity to introduce students to some traditional fruit or vegetables and incorporate these into the canteen menu with the advice of a community member or parent. The class can learn how they could find or grow these and how to prepare them for inclusion in the canteen menu

Strategies to include learners with oral backgrounds:

The class may wish to research food from their original homeland and include a healthy item in their menus or collect catalogue pictures of these foods and label them for future reference. A parent or community member may bring in some of these foods so students can develop some cross cultural knowledge and sensitivities.

Authentic Assessment strategies:

Are students able to select healthy foods for both savoury and sweet dishes that are suitable for the canteen?

Are the students able to conduct a survey and interpret the results of the data?

Are the students able to select a well -balanced, healthy menu for the most popular menu?

Variations for students from diverse social contexts:.

Some students do not have a lot of experience of healthy eating and so they may need more support and guidance than others with their choices of menu. This can be an opportunity to investigate the different healthy foods that are important to different groups of people. Some of these may be a matter of personal taste. However, all groups should be represented and respected for their healthy food choices, even if they are not to the taste of some students (seaweed, sushi, Chinese dessert, Indian sweets etc.)

Technology: Year Three—A Healthy Canteen Menu

Resources: iPads, http://healthy-kids.com.au/school-canteens/canteen-recipes/, http://www.schools.nsw.edu.au/studentsupport/studentwellbeing/schoolcanteen/recipes.php, http://www.nutritionaustralia.org/act/school-canteen-recipes, http://www.education.vic.gov.au/Documents/school/principals/management/gfylman.pdf, http://www.freshforkids.com.au/canteen_fresh/canteen_fresh.html

Introduction:

The school healthy canteen was flooded in the latest downpour and cannot reopen for a week. Upon reopening the newly refurbished canteen hopes to have a new healthy menu to go with its healthy look. Create a menu of new exciting healthy food to be sold at the canteen. The food items must be healthy, sweet and savoury, quickly manufactured, tasty and most importantly, the children must like it.

Discuss:

The key terms: healthy, sweet, savoury and manufactured.

Select the most suitable websites to upload on the iPads and set the students the task in pairs, or small groups (may also be an individual task).

Task: Design the menus so that you have a different menu for at least three days of the week.

- On the menus, you should have two choices of sweet and three choices of savoury for each day.
- You should indicate what is in the food so that you can be sure it is healthy.
- When your menu is complete, *survey your classmates to establish what other students like to eat.
- Depending on the data collected, **revise your menu or leave it as it is for the final version.
- Share all the menus with each other.
- Using tallying, vote for the most popular menu.
- Perhaps this could be suggested to the canteen organisers as a menu for a special day or perhaps a regular day of the week once a fortnight/month/week.
- Or suggest to the canteen organisers that they have a nominated day to provide the winning menu and **then you can collect data from the whole school about its suitability and if the students liked it or not.

Differentiation: this is a differentiated task as it allows students to identify problematic areas as they see them, design solutions in their own way and create a model for the solution to the problem.

Australian Curriculum Mathematics Outcomes

(ACMMG063)

Numeracy Links

*Make models of three-dimensional objects and describe key features

Australian Curriculum Subject outcomes and elaborations: Critique needs or opportunities for designing and explore and test a variety of materials, components, tools and equipment and the techniques needed to produce designed solutions (ACTDEP014)

The Learning Task Year Four – Increasing Classroom Functionality

This task requires students to problem solve solutions to the classroom environmental problems, devise a plan or design for solving these, construct the model or full size solution and present their work using digital technology

Including ATSI perspectives: Typically, these students can be very creative and may be adept at using materials to solve problems of a practical nature. They will be able to contribute another perspective to the solutions as many of them would prefer to be learning in an outdoor environment even if they are living in urban settings.

Strategies to include learners with oral backgrounds:

These students may have had experience with problem solving and may be very creative or they may have had to survive in much worse environments and may not be forthcoming in critiquing the classroom environment. Many may prefer outdoor settings in which to learn

Authentic Assessment strategies:

Can the students identify problems in the classroom environment?

Can they design and make a satisfactory solution for their selected problem?

Can they share their work effectively accompanied by a comprehensive Nearpod presentation?

Variations for students from diverse social contexts:.

Many students have cultural or social embargos on criticising anything that is associated with authority, teachers and teaching so may not be comfortable with this task initially. For other students, the classroom may be the safe place they experience and they may also be reluctant to be critical. The key to involving everyone is to focus on the everyday, small problems that are annoying and fixable – perhaps that just need a fresh perspective and students can engage in fun solutions as well as the practical designs.

Technology: Year Four—Increasing Classroom Functionality

Resources: Variety of model making materials including paddle pop sticks, craft glue, cardboard, etc. and other items that the students may use to make their products from the design drawings.

Introduction:

Design: The classroom has many spaces that require improvements to increase its functionality. The students are to examine the classroom and list physical things that could be improved, made easier, designed better. The students will list problems like reaching books on the top shelf, getting out resources from the bottom of the cupboard, the door slamming shut on a windy day, storing the cleaning cloth so it dries and does not go smelly after art class, storing artworks so they are not dog-eared. These problems are then listed on the smartboard and the students in small groups nominate the one that they will solve using the design process. They may create models if it is not possible to make full-size systems.

Discuss:

- How can we make our classroom more practical for all of us to use?
- What are the problems we have experienced with the environment in here?
- How could we improve our environment so that we minimise these problems?

List the classroom problems and difficult spaces or even lack of functional space or equipment.

In groups/pairs/individually students select a problem/area to focus on

Task: *Design new equipment to solve the problem or redesign the classroom space on paper, then make a model. Develop a presentation using Nearpod and share your work with the class/school or at a parent evening. Develop a set of questions for your audience to respond to using Nearpod.

Technology: Year Five—Water Saving and Partner Planting

Resources: plant pots and soil, disposable masks for students, garden gloves or disposable gloves for students, large jars (one for each student) plants (both vegetables and flowers) activated charcoal, small rocks http://www.lifestyle.com.au/gardening/how-to-make-a-selfwatering-vegie-bed.aspx, https://www.youtube.com/watch?v=d-YjrhzKE6I, http://inhabitat.com/diy-how-to-make-your-own-green-terrarium-to-keep-or-give-away-for-the-holidays/, http://

Differentiation: There are many ways to differentiate this lesson. There are opportunities for students to select their plants and to work with design as they understand it.

Australian Curriculum Mathematics Outcomes

(ACMMG108)

Numeracy Links

*Choose appropriate units of measurement for length, area, volume, capacity and mass

**recognize that some units of measurement are better suited for some tasks than others

Australian Curriculum Subject outcomes and elaborations: Select appropriate materials, components, tools, equipment and techniques and apply safe procedures to make designed solutions(ACTDEP026) working safely, responsibly and cooperatively to ensure safe work areas,

The Learning Task Year Five – Water saving and Partner Planting

The students design and make self -watering pots and terrariums and grow a selection of herbs, vegetables and flowers that thrive together and deter pest such as aphids and snails

Including ATSI perspectives: Although many of the bush tucker foods are familiar to almost everyone now, v some actually being grown as commercial crops, it is important to include the suggestions that these students others in the class offer about native plants that ae edibl and traditionally included in the diet, and are water savir actually water providers in times of drought. Depending the context, these and other students of similar backgrou may be the experts.http://www.mbantua.com.au/bush-tucker/bush-tucker/bush-tucker/bush-tucker/

Strategies to include learners with oral backgrounds: Many of the students in this group may have originated from hot, dry lands and know the value of water. This is really useful task for this group of students as they are not entirely reliant on language to engage with the task, they can observe the other students at work. It is an interactive task so they can work with others who may be able to familiarise them with local plants and herbs and others that thrive in your location. This may also be an opportunity for the class to develop waster saving strategies, including those used traditionally by these people in their original homeland.

Authentic Assessment strategies:

Are the designs practical and do they work?

Are the selected plants appropriate growing partners?

Are the pest repellent plants included in the selection?

Can students explain what they have done to make their products and why they work well?

Variations for students from diverse social contexts:

This is a useful task for all students as it requires students to be active and to engage creatively with quite a sophisticated concept of plants recycling water and self -watering. The resultant products can easily be taken home and the students can replicate the product readily at home, irrespective of the size of their grden or even the lack of a garden.

www.mnn.com/your-home/organic-farming-gardening/stories/12-plants-that-repel-unwanted-insects, https://en.wikipedia.org/wiki/List_of_pest-repelling_plants.

Introduction:
Discuss: Australia is a dry hot country with a shortage of water. Your family has decided that they want to decorate an area of their home with potted plants. This could be an indoor or outdoor area using terrariums, pots or self-watering systems. The plants could include a food, herb or flower garden or a combination that work together for a purpose, e.g. Marigold flowers planted with lettuce help to keep the snails away. Being a green (eco-friendly) family they have decided to use recycled containers (that you will decorate) for the pots and plants that do not require large amounts of water. Questions may include the following:

- What do we need to know about the plants? (if they need lots of water, are they more useful planted with others? Which ones could keep the pests away?, etc.)
- How do terrariums work to save water?
- Have you seen a self-watering system or self-watering pots?
- How could we find out what we want to know?
- *What sorts of measures would you need to use to (i) design and build a terrarium or other structure that you have designed?
- **What different measures are suitable for (i) different attributes that you are working with (for example, length, mass, capacity, temperature, volume, etc.) (ii) the scale or amount of these attributes?

In small groups the students investigate the areas of that they are interested in or the information they will need to find out to make (i) as self-watering unit for vegetables or herbs (ii) a terrarium (ii) a selection of plants that grow well together and (iv) can repel snails and other pests.

Task:
When students have a clear idea of the basic structures they have to work with, what they have to do and have assembled the extra plants or materials from home that they would like to use, they design and make their self-watering planters and their terrariums.

Technology: Year Six—Designing an Interactive Game

Resources: cardboard, Lego or other construction equipment for the moving parts, glue, string, small springs, small containers for water, fasteners and other materials depending on the student projects that are planned https://www.pinterest.com/miacari/homemade-kid-games-educational-fun/.

Differentiation: There are many ways to differentiate this task. The following components may be altered

- The type and number of moving parts required
- The overall size of the game
- The purpose of the game
- Design of the game overall can be made more complex or simpler

Australian Curriculum Mathematics Outcomes

(ACMMG141)

Numeracy Links

* Investigate, with and without digital technologies, angles on a straight line, angles at a point and vertically opposite angles.

** Use results to find unknown angles.

*** Solve problems involving the comparison of lengths and areas using appropriate units

Australian Curriculum Subject outcomes and elaborations: Select appropriate materials, components, tools, equipment and techniques and apply safe procedures to make designed solutions(ACTDEP026) working safely, responsibly and cooperatively to ensure safe work areas,

The Learning Task Year Six – Interactive Game Creation

The students have to create a game to specifications, which include creating at least three of the nominated moving parts and remaining within the limit of the given dimensions

Including ATSI perspectives: Games were traditionally played by everyone but not necessarily at the same time. Some games were played by men and boys only. The class may like to base their game on traditional Aboriginal or Torres Strait islander games and may invite a member of the community or a parent to talk about the traditional games as they know them.

http://www.creativespirits.info/aboriginalculture/sport/traditional-aboriginal-games-activities#toc1

Strategies to include learners with oral backgrounds:

Like other cultural groups, these students come from tribes with diverse traditions and characteristics. The class and students in this group could search to find information about traditional childhood games that would have been played by their parents and grandparents. They may like to adapt one of these to make their interactive game.

http://www.goss.org/index.php/about-south-sudan/games-sports

http://www.africa.com/blog/the_top_5_african_games/

Authentic Assessment strategies:

Are the designs practical and do they work?

Are the moving parts sturdy and usable?

Have the designs satisfied all the criteria?

Can students explain what they have done to make their products and why they work well?

Variations for students from diverse social contexts: In many western cultures, the choice of sports games played by adults may be indicative of their social backgrounds. However, many of the games that were played traditionally before the widespread use of digital technologies were common to many peoples. Some families have games they play traditionally at certain times of the year, especially at celebrations. Students may like to develop their games in the family or community context. Some parents or community member may like to come and talk to the class about the traditional games that they played
Http://www.topics-mag.com/edition11/games-section.htm
http://www.gameskidsplay.net/games/foreign_indexes/

Design: The world of games is always looking for new and innovative games to play. An old favourite is a game called Mousetrap which uses many moving parts. You are to select a theme and create, manufacture and evaluate a game with three or more moving parts chosen from a pulley system, a weight-bearing bridge, a slope greater than 20′, a spring-loaded mechanism or a water/wave component. The game may be no larger than 50 × 50 × 50 cm

Discussion: Questions may include:

- What is an interactive game?
- How might you organise moving parts?
- *Do the angles at which the moving parts connect/move away from with other parts of the interactive game have any bearing on the movement?
- **How could you identify the angles at which the other parts meet the moving parts from the measurement of the angle required for the moving part to move effectively?
- **What might happen to the moving parts if the angles at which they are attached are too wide or too narrow?
- ***How would this impact on your design?
- What types of themes do you think would appeal to the age of the child you are designing for?
- What may be too complex/simplistic for that age of the child?
- What considerations do you think may be important?

Task: Design, making a plan on paper and then construct the game keeping in mind the criteria above.

Identify:

- Theme
- How many players are optimal.
- The age group the game is designed for

Students may bring in items from home to complete their game.

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Author Biographies

Deborah Trevallion is the programme coordinator for the Bachelor of Teaching–Honours (Technology Education) at The University of Newcastle, Australia. She currently holds the prestigious 'King and Amy O'Malley postgraduate award'. She publishes in international journals, has authored bestselling books, and is an international consultant in Technology Education curriculum development and implementation.

Dr. Maura Sellars graduated from the Froebel Institute in London (now part of the University of Roehampton). She has almost thirty years experience as a classroom teacher in primary school settings. She currently teaches mathematics, numeracy and pedagogy at the University of Newcastle, NSW. She is particularly interested in developing an equity pedagogy, belonging and inclusion, critical and creative thinking and literacy and numeracy as social practice.