**Part B: Guided Inquiry task and lesson plan**

 **YEAR 6 GUIDED INQUIRY UNIT**

***‘How do we modify the natural water cycle to meet human and environmental needs?’***

***By Ann Maher***

**Year Level: 6**

**Teachers:** Classroom teacher (CT) and Teacher Librarian (TL)

**Inquiry Duration:** Term 2 (10 weeks) One hour weekly library lesson.

**Inquiry Question:** How do we modify the natural water cycle to meet human and environmental needs?

**Learning Areas:** Design and Technologies, Critical and Creative Thinking (CCT)

**Students Outcomes:**

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| Design and Technologies | Examine how people in design and technologies occupations address competing considerations, including sustainability in the design of products, services, and environments for current and future use  ACTDEK019Investigate characteristics and properties of a range of materials, systems, components, tools and equipment and evaluate the impact of their use ACTDEK023 Critique needs or opportunities for designing, and investigate materials, components, tools, equipment and processes to achieve intended designed solutions ACTDEP024   |  |
| General Capability | Critical and Creative Thinking (Level 3) | Inquiring, identifying, exploring and organising information and ideas* Posing questions
* Identify and clarify information and ideas
* Organise and process information

Generating ideas, possibilities and actions* Imagine possibilities and connect ideas

Reflecting on thinking and processes* Transfer knowledge into new contexts
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**Assessment:**

Design and Technologies

Will be assessed by the CT:

* Observation of student use of research tools
* Jigsaw group questions posed and shared research fact file
* Peer Review feedback and analysis of feedback
* Reflection sheets
* Completion of urban water cycle activity sheet
* Student models and design visuals - product presentation and explanation

Critical and Creative Thinking

Will be assessed by the TL:

* Student reflection sheets
* Student discussion during the inquiry process
* Student models and design visuals - process and final product presentation

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| **Phase of Guided Inquiry** | **Week & Description** | **Teaching and Learning** | **Resources** | **Teacher Roles** |
|  | **Activate** students’ curiosity and background knowledge about how we meet human and environmental needs in the managed waste water cycle. | **Week 1*** Read **‘*What do they do with all the poo from all the animals at the zoo’?***By Anh Do.
* Introduce the discussion: “What happens to our human and animal waste water products?
* Discuss and evaluate the text and conclusion at the end of the story.
* Utilise student background knowledge.
* Discuss research methods
* Students record what they have learned or need to learn on reflection sheet.
 | * Interactive whiteboard and Google Docs for recording student responses.
* Reflection sheet
* Text
 | **TL:*** Locates, presents and leads discussion on the text
* Introduces GI model to class. Discussion and feedback of the inquiry process to continue during each inquiry phase.

**CT:*** Records student responses on Google Docs
* Creates assessment rubric and saves to Google Docs.
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|  | **Students** begin to build on their background knowledge of the components of the managed waste water cycle. Students discover interesting ideas behind the systems and designs to manage the cycle. | **Week 2*** Students access Sydney Water website showing the stages in the waste water journey.
* Students work with a partner to complete and label a diagram on components of the urban water cycle: *How do we clean recycled water?*
* Pairs join to compare and share information.
* Students use research tools to begin to formulate areas of interest and topics.
* Students to consider topic area for group focus.

   | **Website:** https://www.sydneywater.com.au/.../Watermanagement/Urbanwatermanagement/index...* Blank diagram and labels for urban water waste cycle (Sydney Water website).
* link to World Books Online
* Physical resources for students to access for research.
* Interactive whiteboard and Google Docs to record items of interest and questions
 | **TL:*** Demonstrates how to use various research tools and leads discussion on the use of reliable information sources.

**CT:**Lead discussion on posing questions and recording interesting facts and areas for further investigation. |
|  | **Students** begin to explore interesting ideas around the broad topic of the urban waste water cycle. Students may compare the design process for the treatment of urban waste water with areas that may need alternative design processes e.g. Composting toilets, biocycles etc. | **Week 3*** Students to share information and areas of interest with the class. Record on Google Docs.
* Discuss the topics flagged by students and categorise into broad areas for group focus and research. For example: What happens to waste water where people are not connected to the urban waste water cycle?
* View digital resources describing alternative design processes for waste water disposal
* Discuss a range of resources available for students to explore a focus area of interest around the topic.
 | * Google Docs to record findings.

 **Website:** Alternative Arrangements for Sewerage disposal: https://www.youtube.com/watch?v=F0dQZ9siS2YExploring wastewater alternatives: https://www.youtube.com/watch?v=mcHO46-YiIo | **TL:*** Lead discussion of the topics flagged by students and facilitate discussion on how they can be categorised into areas of focus for further research.

**CT*** Create a template or mind map scaffold on Google Docs to record topics and questions.
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|  | **Students** narrow their focus of inquiry and pose questions that will contribute to the over- arching inquiry question. | **Week: 4*** Students identify which aspect of the waste water cycle design process that they are interested in researching further to determine which jigsaw grouping they will join.
* Jigsaw groups work to pose potential research questions.
* Students rate questions in terms of usefulness in contributing to the overarching inquiry question.
* Groups enter their research questions into their shared document.
 | * Student iPad, computers
* Shared research template in Google Docs.
 | **TL:*** Lead discussion for the formation of topic interest groups and the inquiry questions that each group will be researching.

**CT:*** Work with TL and individual groups on formulation of inquiry questions, research direction and resources.
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|  | **Students** collect and record detailed information about the waste water system and design process according to their specific research area. | **Week: 5,6*** Students use research tools to locate and choose the most relevant information for their research area.
* Students record information on Google Docs.
* Students reflect on the research process.
* Jigsaw groups rotate so that one member from each group presents their research to the new mixed group.
 | * Students iPad, computers
* Google Docs
* Reflection sheet
 | **TL, CT:*** assist students during research
* Facilitate and oversee the recording of information of jigsaw groups.
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|  | **Students** organise their gathered information to create their product and “Tell the story” | **Week: 7,8*** Discuss and brainstorm the different methods that students can use to present their research to the class/school.
* Students researching the design systems for managing the waste water cycle may choose to construct a model illustrating the three stages of waste water treatment.
* Students researching alternative wastewater design systems may choose to build their own composting toilet.
* Students may use design visuals to present information. Theme: ‘*The Journey of two soap suds as they pass through waste water cycle’.*
 | * Students’ iPads, computers.
* **Website: Designing a composting toilet** <https://makezine.com/2015/08/28/5-things-you-didnt-know-about-composting-toilets>
* **Waste water model**: containers, plastic tubing, filters (3 grades from coarse to fine), water containing graded sediment.
* **Composting toilet:** sawdust, paper, container, compost e.g. banana peel etc.
 | **TL:*** Assist students to select and synthesise useful information from the research groups for use in their presentation.

**CT:*** Assist students in the discussion of their presentation of information to the class/ school.
* Ensure that students have resources available to present information in their chosen format.
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|  | **Students** present their information to the school and community during Science Week.  | **Week: 9*** Students set up their models and presentations in the library to explain the design and technology of their system and how it works.
* Students can post a peer evaluation using a set of criteria to guide their feedback on the ‘Science Noticeboard’.
 | * Science Noticeboard Feedback criteria
 | **TL, CT:*** prepare criteria scaffold for peer assessment guide
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|  | **Students** evaluate the achievement of their learning goals, reflect on the content and reflect on the process of their learning. | **Week: 10*** Students review the peer feedback provided to them.
* Students complete the Reflection sheet
* What they have learnt about the managed waste water system.
* Why do we need to modify the natural water cycle by designing and building managed systems?
* What are some of the alternatives to managed systems?
* The most interesting information that you found.
* Which research skills do students feel they have developed and which skills need further development?
* How did the groups work together in gathering information and putting it into presentation format?
* What they found difficult about the task.
* What they enjoyed most about the task.
* What could be done to improve the inquiry process?
 | * Reflection sheet
* Students’ iPad, computers.
 | **TL, CT:*** Facilitate peer review discussion and evaluation
* Assist students in discussion and self-evaluation in their reflection sheet.
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**DETAILED LESSON PLAN FOR INTRODUCTION: WEEK 1**

**Inquiry Stage:** Open **Teachers:** Classroom Teacher (CT) and Teacher Librarian (TL)

**Location:** Library

**Learning Goals:**

* + Students will reflect on their current knowledge and research skills
	+ Teachers will promote curiosity for the topic
	+ Teachers will review student reflections and determine possible areas for further support throughout the inquiry process.

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|  | **Teaching Team** | **Students** |
| **Introduction**10 minutes | **Week 1*** **Read ‘*What do they do with all the poo from all the animals at the zoo’?***By Anh Do.
* Discuss the question: “What happens to our human and animal waste water products? Define meaning of waste products, refine inquiry and introduce term “managed waste water cycle’.
* Discuss the options for waste disposal as presented in the text. Evaluate these options. Are they credible? Give your reasons.
* Discuss the conclusion at the end of the story. What do you think the monkey may have whispered to the boy as a possible explanation?
 | * Engage with text.
* Participate in discussion
* Brainstorm and record a list of house hold waste products and sources on Google Docs.
* Imagine possibilities, discuss ideas with a partner and share with the class.
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| **Lesson Body**40 minutes | * Introduce the G.I. model
* Introduce students to the overarching inquiry question: ‘How do we modify the natural water cycle to meet human and environmental needs?
* Brainstorm possible options for waste water disposal in groups utilising student background knowledge.
* Discuss various research methods with students in order to answer the over- arching question.
* Introduce Google Docs
* Access the task summary for students.
* Introduce the Reflection sheet.

  | * Discuss the phases of the G.I model
* Work in groups discussing possible options for waste water disposal and the reasons that this is necessary.
* Students to explore various research methods.
* Students review the task summary and the assessment rubrics.
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| **Reflection**10 minutes | * Discuss the use of the student Reflection sheet as an assessment tool.
 | Students reflect on their current knowledge and skills indicating their areas of strength and /or concerns and challenges regarding the task. |